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Protection against environmental pollution by noxious substances other than oil, with reference to the major ports of Saudi Arabia

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PROTECTION AGAINST ENVIRONMENTAL POLLUTION BY NOXIOUS SUBSTANCES, OTHER THAN OIL, WITH REFERENCE TO THE MAJOR PORTS OF SAUDI ARABIA

by

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The contents of this paper reflect my own personal views and are not necessarily endorsed by the UNIVERSITY.

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ABSTRACT

This project examines the present situation regarding protection against marine environmental pollution by noxious substances, other than oil, in the major ports of Saudi Arabia.

The existing facilities for such protection are investigated for each of the major ports in turn, and are summarised with comments on their strengths and weaknesses with reference to international requirements and recommendation.

Proposals are then offerred towards the improvement of these facilities with suggestions on how these proposals might be implemented.

PREFACE

I am particularly grateful to the Ministry of Communications represented by the Minister of Communication, Deputy Minister for Transport Affairs, and the Director General who gave me all the encouragement to join the World Maritime University.

I am also indebted to Professor T Balmer, my course professor, and Professor Gunnar Stubberud, both of the World Maritime University, for helping me so much on my research project, tempering my enthusiasm with realistic analysis.

Many thanks to all the Maritime Administrations in the Nordic Countries.

Also many thanks to Mr. Sven-Ake Wernhult, and to Mrs Freddie Linau for typing this project.

I wish to add that the views I express here on this very important topic are exclusively mine, and in no way reflict those of the Government of the Kingdom of Saudi Arabia which I currently serve.

Khayyat Khalil Ahmed

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I. INTRODUCTION

1.1. Premble

The rapid development of industry in the Kingdom of Saudi Arabia has resulted in an ever increasing demand for complex chemical and petroleum products for use as raw materials and proceesing agents.

Chemicals that were unheard of outside of laboratories twenty years ago are now being used in considerable quantities by the pharmaceutical, plastics, paint and mining industries.

Many of these substances are hazardous to man and the quantities currently being transported throught our cities have exposed our society to the very reals risk of major disaster.

Hazardous substances have precipitated disasters over seas, the devastating of which was the LPG tanker explosion near Barcelona, Spain, that resulted in the deaths of over 200 holidaymakers in the early part in 1978.(1)

This incident, more than any other, served to focus public attention on the danger involved in the transportation of hazaradous materials, and in the apparent lack of control over its operation.

In the Republic of South Africa, the Durban Hexane tanker fire in

Foot Note

1. The transportation of hazardous materials J. C. Hillman, 1981.

July 1978, and three subsequent incidents involving the spillage or loss of cyanede, attracted wide publicity and created sufficient alarm for the authorities to decide to take some action to prevent them.

1.2. Background and Objectives

The Kingdom of Saudi Arabia has an area of about 2.4 million square kilometres and has a coastline of about 2,000 kilometers in total length. It has five major ports two of which are situated on the East coast and three on the west coast (See fig. 1).

The Kingdom of Saudi Arabia imports and exports many types of cargo where major industrial complexes have been established particularly those industrial complexes that are concerned with petrochemicals and otehr hazardous materials. There are such complexes in Jubail and Yanbu.

The volume of imports and exports of petrochemicals and other hazardous goods is already large in all of the Saudi Arabian Ports and will be larger in athe future. Many people are involved and more will be involved all of them will have to meet the practical problems of the trade. The governments' meteorological and environmental protection agency estimated in a recent report that the Kingdom produces 500,000 of hazardous wastes each year. (2)

Foot Note

2. Toxic Wastes threaten Gulf states (Times of India 1985).

Ports administered by the Ports Authority

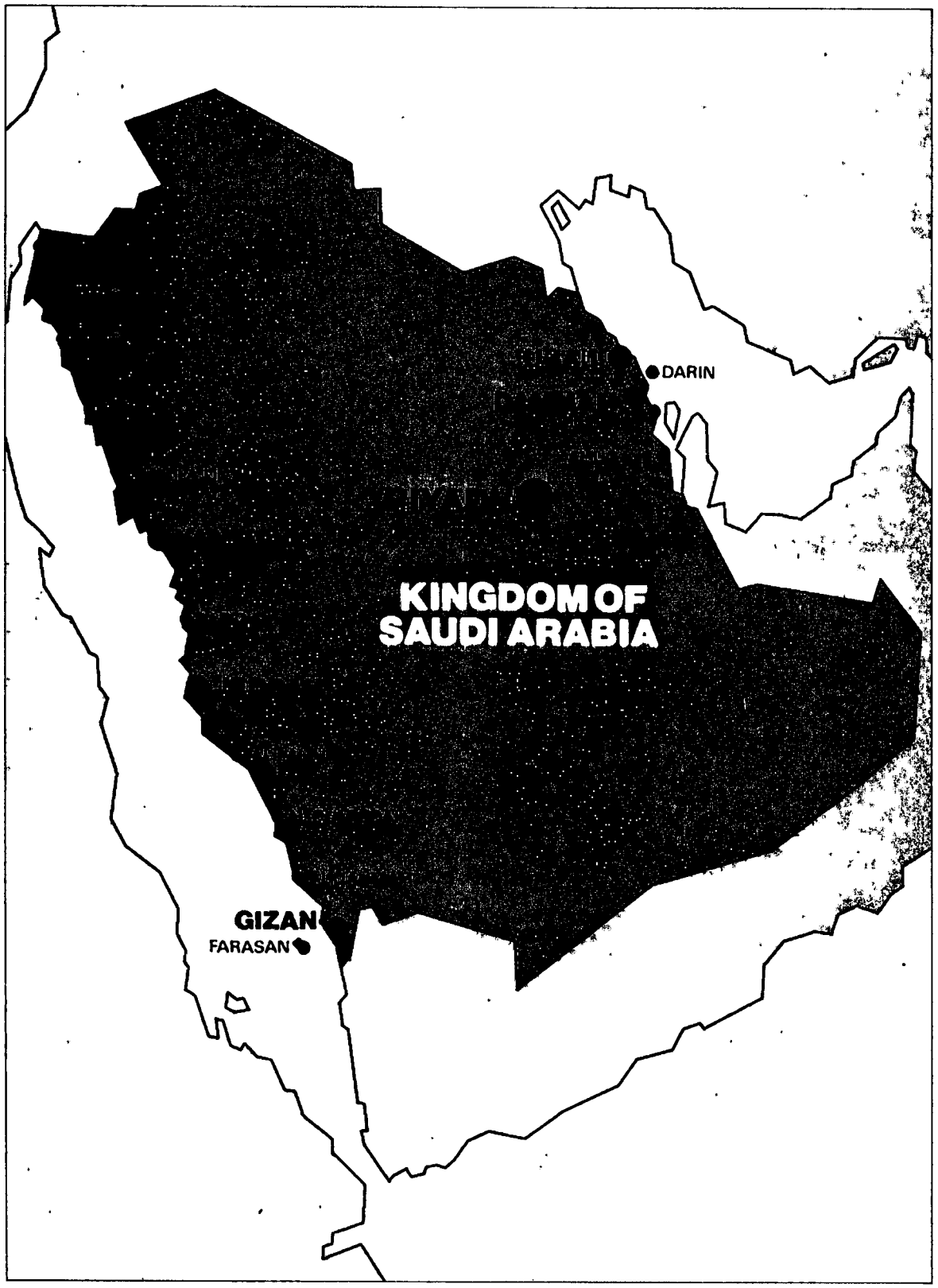


Figure 1

1.3. Sources of Noxious Substances in Port Areas and Thier Effects on Marine Environment

The subject of marine pollution is very broad. The facts about seriously harmfull effects of marine pollution have been established by seientists and exonomists isworth while the sources of pollution in Saudi Arabia are mainly products of petrochemical industry and chemicals imported for agricultural industry.

In the light of the main Sources, the problem can be divided in two types

A. Organic Pollution

B. In-organic Pollution

The main causes of this pollution are:

1. Port Activities
2. Shipping Traffic
3. Industrial Waste
4. Waste water.

A. Organic Pollution

This is due to chemicals which contain Hydrogen or Carbon or both in itsformula Petrochemical Products, which have lately been introduced in Saudi Arabia, or one of the major source. Other Sources are, natural gases (80% methane) Organic Acids, Alcohols, insecticides, Solvents, Organic Salts of toxic elements as lead, Ar-

senic, Mercury and other Pharmaceuticals etc.

Some of these material are solvable in water others either sink of float the most harmful effects come from dissolved materials, these effect the life at sea.

B. Inorganic Pollution

Inorganic pollution is the result of spills or spreading of inorganic chemicals in sea water, mostly due to port operations or shipping. Some of these chemicals also come to sea through Industrial Waste these chemicals include some very dangerous chemicals, which are essential for Saudi Arabian Industry.

Examples of these chemicals are:

1. Metallic Acids such as, Sulphuric Acid, Nitric Acid, HCL etc.
2. Salts of Mercury, Arcenic, Lead, or Bromides.
3. Insecticides (Poisonous to All Life).
4. Gases, as Amonia, Sulgher Dioxide Hydrogen Sulphide.
5. Caustics as Sodiam Hydroxide or Puttocoium Hydroxide.
6. Some metals Such as Phosphorus.

Foot Note

Source. 1. Dessolved Organic Matter in Coastal waters at Saudi Arabia K. K. Behairy and M. M. EL sayed.

And also pollution effect over marine life for example:

1. Fish takesits oxygen from the dissolved oxygen in sea water. Similarly any other toxic substance can go into fish there by killing it, or making it unsuitable for human consumption.

2. Sea Bathers with chemicals or dangerous microbes can transfer these chemicals to bodies of people who are swimming this can spread different kinds of disease.

3. Birds effect with pollutants which float on the surface, these birds live on small fish. Bird conserve their temperature by surrounding their body with special oil, which also protects them from wetting. Chemicals or solvents can dissolve these oil, thereby killing the birds.

1.4. Saudi Arabia Member of IMO

Saudi Arabia became a member of "International Maritime Organization" on 25th February 1969 the Ministry of Communication is responsible, for the IMO affairs.

The Kingdom is represented not only on the council but on such Committees as, Maritime Safety Committee, Marine environment Protection Committee, and, Sub-Committee for Safety of Navigation.

1.5. Relevant IMO Recommendations and conventions

Some of the IMO Publications which are highly relevant to the subject of these paper, are given below:

1. International Conference on Marine Pollution, 1973.
2. 1978 Protocol relating to MARPOL/73.
3. IMO Convention on the Dumping of wastes at sea.
4. Facilities in Ports for the receotion of oily Wastes, 1976 - 78.
5. International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC CODE).
6. International Code for the Construction and Equipment of Ships Carrying Liguified Gases in Bulk (IGC CODE).
7. International Maritime Dangerous Goods Code (IMDG CODE).

The codes mentioned at No: 5 & 6, does not have the status of an International Convention, but, has gained acceptance by many governments, as representing good practice even where they gave not been included in national legislation. These Code give, in great detail the requirements for the construction of chemical and gas carriers.

The Code mentioned at No. 7 deals with loading and storage of Dangerous Cargoes these Code is already in use internationally by sea transport and land transport organizations.

The Conventions mentioned at No. 1 and 2 are IMO Recommendations, for prevention of pollution in general, and are already in force partiolly.

1.6 Recent IMO Requirement

Recent IMO Recommendations and requirements give much useful information, on the practical matters of cargo handling, tank cleaning, product testing, etcetra, to port authorities and other organizations concerned with hazardous cargoes. This information is useful to the authorities since it is relevent to protection of coasts and port areas and should reduce the likelihood of future catastrophes. It also gives advice on the establishment of reception facilities, the training of personnel, etcetra. All this information (Publications) should be available in every Saudi Arabian Ports.

II. SITUATION IN PORTS OF SAUDI ARABIA

2.1. Jeddah Islamic Port

Activity in Jeddah Islamic Port has continue unabated over the last few years thus maintaining Jeddah's position as the leading Saudi and Red Sea Port. The continuous growth, between 1979 and 1980 in indicated by these following table showing Jeddah cargo discharge figures.

1976 total 5,225 million tons
1977 total 8,447 million tons
1978 total 9,979 million tons
1979 total 12,527 million tons
1980 total 14,000 million tons.

These figures are obtained from the official publications of the Jeddah Islamic Port Authority which published such figures until 1980 but appear to have discontinued the practice since then. The truly international nature of Jeddah is shown by the fact that vessels from over 60 nations regularly call at the port.

The increase in the average amount of cargo carried by each vessel is a reflection of the growing importance of containerisation and shipping of commodities in bulk, trends which the ports Authority in doing everything to encourage. About one third of all general cargo arriving at the port is now containerised and this will rise

to two thirds in the next few yrars. With imports of almost 300,000 TEU's per year, Jeddah ranks as one of the busiest container ports in the world.

The main container terminal is being extended to include berths 33 and 34 and the facility at Berth 37 (with a ro-ro ramps). The saudi Port Authority has ordered two new container gantry cranes to bring the total number of container cranes to eight. The six new container yard cranes on order will extend storage capabilities, while 32 straddle carriers are already in operation together with noumerous headtrucks and trailers. In addition, an equipment workshop has been provided at the main container terminal.

Following the appointement in 1979 of a single contractor to deal with ro-ro traffic, the quality of service offered by the port has continued to improve. Productivity of the ro-ro berths is about 200 tonnes per berth per day. Contruction materials, including cement, account for the major part of total cargo discharged, but foodstuffs are also very important with about 75% of all the Kingdom's seaborne food imports comming through Jeddah, Reefer and chilled cargo represented nearly 15% of all food imports during 1979 and 1980: the discharge itself being constrained by a lack of cold storage space in the Jeddah area.

In view of climatic conditions and the importance of this cargo,

berths 13 and 14 are being developed as a new multi-purpose food and fruit terminal. Vessels carring reefer and chilled cargo will genrally be allocated there, though additional contigency capacity and facilities will be available on berths 12 and 15. This new terminal, which is scheduled for completion in 1983, have fully computerised discharge and delivery procefures and will feature spiral elevators, 35 tonne gantry cranes and conveyor belts of the highest technical standard.

Jeddah is the largest importer of livestock in world with 2,9 million head a year and plans are in hand for the development of a new livestock terminal. This will facilitate more efficient discharge care and delivery of animals. Since October 1980 livestock has been handled by existing integrated stevedoring contractors rather than by agents of consignees personnel.

Anew multi-purpose terminal will be built in the north west area of the port. The new berths at this terminal will provide highly productive additional capacity for ro-ro and container traffic. Of the construction items, bulk cement is predominant, representing 50% of the total. Moreover, it is the biggest single commodity imported through Jeddah.

Reflecting this, the bulk cement vessel "Jeddah Cement" on of two existing silo vessels, was replaced early in 1981 by on with even greater capacity, thus increasing the combined capacity of the two

silo vessels from 14,000 to 20,000 tonnes per day or 4,5 to 6,4 million tonnes a year (at 90% utilisation).

A new passenger terminal will be developed in the north west area of port to provide improved facilities, especially for pilgrims.

Dredging work in the area of the southern channel and the establishment of buoyage together with a further programme of wreck removal in the region of the north west area will make Jeddah Islamic Port even safet for sea-going vessels.

The excellent safety record in Jeddah Port is not purely fortuitous. Considerable resources have been deviated to the installation and implantation of the latest safety equipment and techniques as well as to an extensive training programme. The most modern and integrated fire-fighting systems have been provided in the Port of Jeddah. The system incorporates sophisticated control centres with electronic monitors for fire alarm and detection equipment linked with an intricate and highly efficient network of sprinklers in all transit sheds and warehouses. In addition, the port have mobile fire fighting equipment both ahsore and afloat which will make use of the extinguishing agents. All ports undertake weekly fire practices ashore and afloat.

A specialized company has been appointed to provide on-going training of personnel concerned with all aspects of safety in the ports.

Particular care is taken with regard to the discharge of hazardous cargo which is restricted to specific areas withen the ports.

Safety is not only confined to the protection of goods and personnel. Stringent rules and regulations have been implemented for the carriage and discharge of livestock at Saudi Ports Veterinary care is also provided.

2.2. King Abdul Aziz :Port Dammam

The latest phase of berth construction work was completed in 1979 and Dammam now has a total of 39 berths. Sixteen of these are in the West basin and twenty-two are in the East basin plus a small craft harbour.

The port is the second largest in Saudi Arabia both in terms of size and cargo throughput.

Imports have increased by 120% since 1979 as shown by the following table:

1976 total 4,174 million tons

1977 total 6,568 million tons

1978 total 7,686 million tons

1979 total 8,739 million tons

1980 total 9,150 million tons

As at Jeddah, the trend is towards containerisation and away from

general cargo. 25% of all general cargo is now that the approach channel has been dredged to 15 metres allowing third generation container vessels to call at the port, and with development of a container freight station. The main container terminal has been enlarged to include berth 26 bringing the number of specialized berths in the terminal to 4 with a total length of 1,000 metres. A terminal workshop is under construction.

Contingency plans allow for an increase in the number of berths in the terminal to seven if the need arises and the Saudi Port Authority has ordered two additional container cranes to supplement the existing four. The multi-purpose terminal at berth 22 has container cranes and a ro-ro ramp, allowing ro-ro/lo-lo and conventional operations. A railhead is being provided in teh main container terminal. This will improve the rail link between the port of Dammam and Riyadh, and facilitate the transfer of containers from the port to the Riyadh Freight Terminal. Enhanced control facilities, including a watchtower for rail traffic within the port, are also being provided.

Dammam's cargo is more preponderantly construction material (accounting for 69% of imports through the port) than that of Jeddah. This is dueto the rapio development of the Eastern province. Bulk cement imports (presently amounting to 28% of total imports) will probably increase with the planned provision of a third bulk cement vessel.

In addition, Dammam port handles a large volume of food imports for the Eastern and the Central provinces. Reefer and chilled cargoes, for example, have increased dramatically, rising from 5,000 tonnes in 1975 to 100,000 tonnes during the last year. A new cold store is planned to facilitate the handling of such cargo.

Besides the consolidation and streghtening of the integrated stevedoring system, work towards increased quay mecanisation is in hand. Substantial amounts of new equipment have been delivered to the port. The equipment includes 60 forklift trucks, bringing the ports fleet to 515,24 mobile cranes (total 156), 8 straddle carriers (total 23), 16 head truck tow motors (98) and 36 trailer chassis (281).

Capacity of 1,500 tonnes and including abuoy yard is being constructed to service port vessels and aids to navigation.

Other projects in the design and planning stage include a port control tower and a computerised workshop/store complex.

As in all Saudi Ports, safety is high on the list of priorities. The integrated fire protection and fighting systems have already been described, and all cranes have been fitted with fire fighting appliances. In addition, an exposives terminal is to be established in the north western part of the port. This will not only guarantee safety but will ensure that the required accident preven-

tion procedures do not interfere with the smooth running of Dammam port.

A contract has been awarded for the construction of a ship repair yard including two floating docks of 22,000 tonnes and 10,000 tonnes lifting capacity.

2.3. Jubail Port

Port facilities in the Kingdom are not being developed in isolation, they are part of the countrys' integrated approach to planning of which Jubail on the Gulf Coast is the prime example.

The construction of the new city of Jubail (together with yanbu), the core of the Kingdoms industrialization policy, requires sophisticated port faclities for imports of large, heavy and dangerous goods, and for the eventual export of industrial products.

The Port Authoritys' experience in Jeddah and Dammam has equipped it for the task of developing integrated ports from the outset. Jubail Ports' commercial harbour will eventually have sixteen berths with an annual throughput capacity of nine million tonnes.

Since 1978 throughput has risen from 0,85 million tonnes to 1,5 million tonnes in 1980 as is shown in the following table.

1978 total 0.849 million tonne

1979 total 0.954 million tonne

1980 total 1,510 million tonne

Berth five commenced operation in January 1980.

The new container terminal at berths fifteen and sixteen, with a combined length of five hundred twenty metres, commenced operation in September 1980. It has four container gantry cranes, nine transtainers, and a stacking area of 165,000 square metres.

Thus out of tine completed berths seven were in operation at the end of the year the remaining berths are in operational during 1980.

Construction materials form over 80% of port troughput, largely reflecting the development of the industrial complex.

The volume of cargo will increase rapidly over the next few years as industries start up, the population increases and the construction of permanent homes for workers and executives speeds up.

Demand for cement will increase and will be met by the output of a permanent bulk cement facility, previously used by the contractor during the construction of the port.

In addition to the new container terminal (with 120 plug-in points for reefer containers) the ports facilities now include a port administration bulking, customs offices, police stations, mosques, control towers and weighbridges. Cargoes passing through Jubail are often of a very special nature such as diglycolamine imported by

Aramci. Before approving such imports the ports Authority ensures that there is no danger to the environment whether directly, by mixing with otheragents handled in the port, or by leakages. Similary, personnel handling such cargo must wear protective clothing and emergency shower and eyewashing facilities are available.

Special fire protection facilities include infrared, ultra violet and long range photo-electronic smoke detectors as well as conventional smoke and heat detectors. A halon gas storage tank is under construction. The ports hazardous goods store, switchrooms, computer facilities and room in the control tower are protected by a gas saturation system. Although these are early days, exports are already forming part of the ports' throughput. Export of scrap metal has commenced and is expected to reach 200,000 tons a year in the near future. The export of sulphurin bulk start during 1980 at a rate of 3,000 tones a day. Work is well advanced on the further improvement of navigational aids in the port.

Tenders have been invited for an extensive radar surveillance system. It will include two radar stations, one at the Open Sea Tanker Terminal and the other on Juraid Island. Both will be equipped for remote control monitoring and will have shipshore-ship communication. Later, a station near Gharibe reef will ensure that Jubail has one of the safest approaches in the world for large vessels.

Before its present development, Jubail was a fishing port and the

continuance of this been encouraged by the allocation of 300 metres of berth space for fishing vessels. Al Jubail's industrial harbour, quay walls have been completed and the system of breakwaters protecting the port complex is finished. Nine deep-water berths (depth 14 metres), the open sea tanker terminal (30 metres) and 600 metres of quay (6 metres) have been handed over to the Ports Authority.

amodule import facility with a depth of eight metres, and several workshops forming the nucleaus of a marine yard for the entire port complex have been completed.

2.4. Yanbu Port

The development of Yanbu has proceeded rapidly in terms of both throughput and completion facilities. To mark these achievements the port was inaugurated by his Majesty King Khaled in November 1979.

The port now has nine berths with a total length of 1,940 metres and water depths ranging from nine to twelve metres.

Since 1978, the volume of cargo handled has almost doubled, reflecting the speed at which the industrial complex is taking shape. The port's annual cargo handling capacity has been raised to over three million tonnes.

As in Jubail, construction materials (especially cement) account for the major part (about 90%) of all imports. There is a land ba-

sed bulk cement facility with a capacity of 4,000 tonnes/day handling over 1,1 million tonnes a year.

Most cement imports are destined for the rapidly developing areas in the northern region of the Kingdom and the royal Commission's industrial complex twenty kilometres south of the port.

For other cargo, 8,000 locally-produced pallets have been purchased. The approach channel has been widened to 200 metres dredged to a depth of twelve metres allowing larger vessels to enter the port. Seven transit sheds, a warehouse a storage area of 60,000 square metres and 462,000 square metres of paved open storage area have been completed.

A barge wharf with a marine workshop, where tugs and other floating equipment can be serviced, has been completed. Other improvements include a new water supply system with storage reservoirs and a pumphouse.

Development planned include a stand-by power plant, an enhanced for fighting and protection system and teh conversion of two general cargo berths into a container terminal with a back-up area of 180,000 square metres.

New equipment in order includes sixteen forklift trucks and a new mobile tower crane, new head trucks and chassis, and two new powerful tugs. Equipment to combat oil pollution, including an oil

skimming vessels and boom are also on order. Communications improvements include a new port telephone system and two VHF coastal radio stations.

The table down obtained from Port Authorities showing the increase in cargo discharge during the year 1976 - 1980.

1976 total 0.680 million metric tonnes

1977 total 0.850 million metric tonnes

1978 total 0.726 million metric tonnes

1979 total 1,075 million metric tonnes

1980 total 1,330 million metric tonnes

2.5. Gizan port

The first stage of Gizan port's development was completed in 1979. It provides three general cargo berths and a ro-ro ramp, an administration building, a workshop, two transit sheds, a desalination plant with a capacity of 250 cubic metres a day, a water tower, a four-megawatt power plant and a customs building. Dredging of the approach channel to nine metres and along-side the berths to a minimum of nine metres is now complete.

The second stage of development started in 1980 and increase the total number of berths in 1982 to 13 berths. It includes a two berth container terminal with a length of 500 metres. It have ro-ro ramp, four container cranes, and a back-up area of 150,000 square

metres. A livestock shed will also be provided.

Gezan's fleet of equipment is regularly supplemented during the year and includes 45 forklift trucks, eleven mobile cranes, nine head trucks and ninteen trailer chassis.

On completion of the port's development, its annual throughput cpacity will be 3.3 million tonnes. The volume of cargo passing through the port has continued to increase as is shown in next. table was given by Port Authority during the year 1976 - 1980.

1976 total 0.483 million tonnes

1977 total 0.550 million tonnes

1978 total 0.663 million tonnes

1979 total 1,049 million tonnes

1980 total 1,480 million tonnes

Cement and otehr construction materials constitute the bulk of cargo (90%) passing through the ports.

The establishment of a bulk cement terminal has led to a rapid change form bagged to bulk cement imports, and throughput is now about 3,000 tonnes per day.

Imported food stuffs are also very important to the densely populated region of the Asir. The planned cold store will facilitate the import of chilled and reefer cargo in future.

Besides improved fire fighting and protection facilities, safety measures include the planned creation of a new dangerous goods storage area. For maritime safety, twelve new buoy have been placed in the northern approach to the port. On of the important projects covered by the third development plan will be the positioning of extensive new navigational aids in both the northern and southern approaches to the port.

III. POLLUTION PREVENTION AND SAFETY REQUIREMENTS IN PORTS OF SAUDI ARABIA

3.1. The Packaged of Good and Labeling

International Conference on Safety of Life at Sea 1974, amendment 1983 for chapterseven, and International Maritime Dangerous Goods Code (IMO Code) classify the chemical compound into nine classes and defind each category and The procedurs for Carring the dangerous goods in packing and it common and readily understood practice to display worring labels where dangers exist. In many cases it is required by low and the public are used to seeing signs such as DANGER-HIG-VOLTAGE, CAUTION- SHARP BEND and WARNING - NOT FOR INTERNAL USE! It is alarming to note that, with a few exceptions, such imprecise descriptions have been regarded as sufficient.

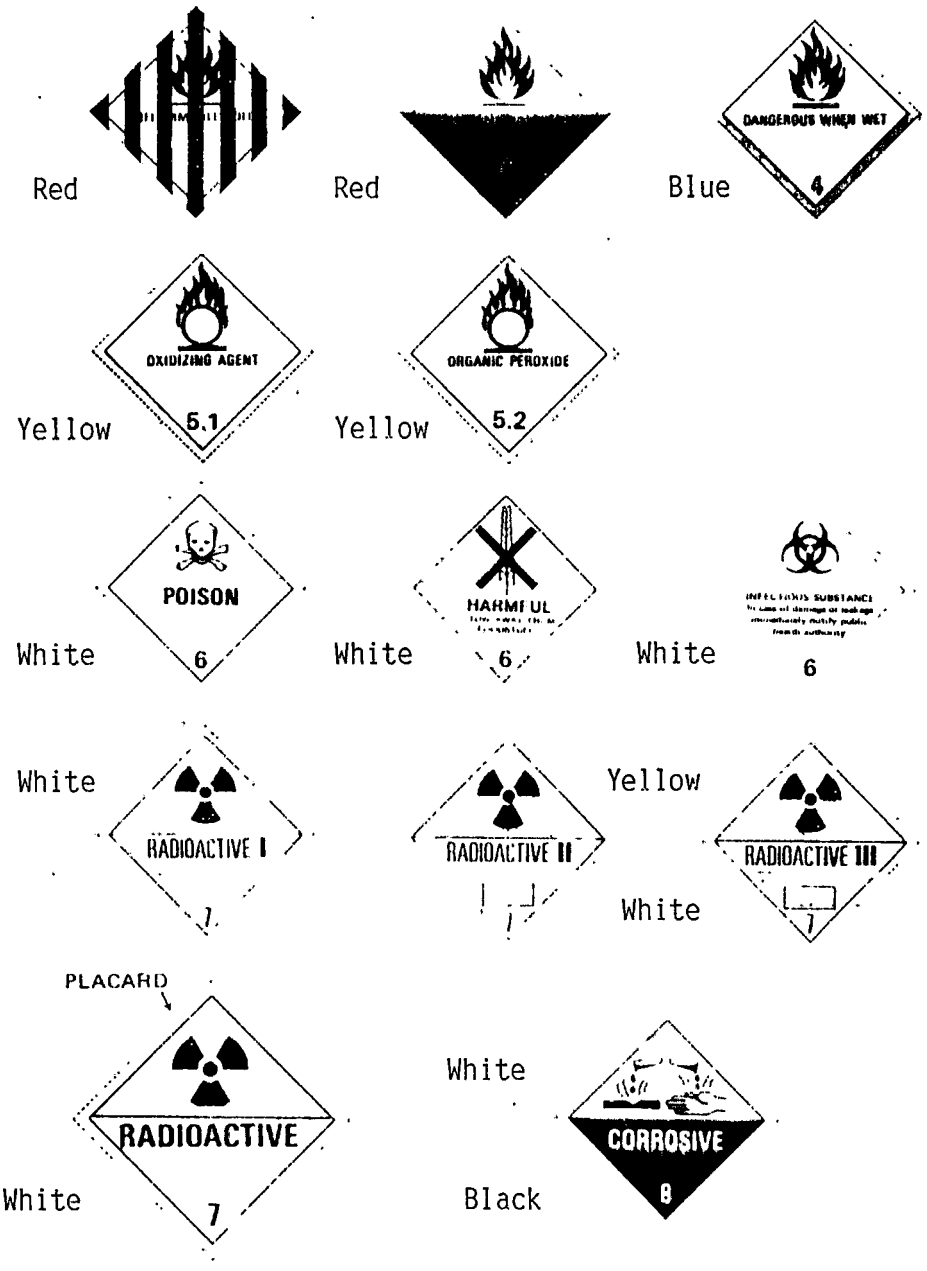
In the event of an accident resulting in the major spillage of a toxic or highly flammable liquid it is sensible to have some readily understood indication to the general public to keep away and to prevent any damage and safe way according to I.M.D.G. Code which be adapte by ports Authorities. The curious and ghoulish are often attracted to accedent scenes and an overturned tanker is always of interest. A general warning sign is only of limited use because as people become more curious they like to know what the danger actually are. The ever-increasing international traffic in containers and trailers also suggests that this requirement

should be bet by an internationally recognised method. A satisfactory answer to thisproblem is to make use of the international warning diamonds containing a pictogram of the hazard involved and which may include the UN hazard class number. Some examples of these warning diamonds are shown in figure 2.

The final cost of a hazardous materials incident in Rand and lives is often directly dependent on what remedial action is taken during the first 20 - 30 minutes after teh accident occurred. In order for the emergency services to be given the best possible chance of dealing effectively with an incident they must be able to identify the material involved and have some idea of how it is to be handled. The numerous names by which a substance may be known (chemical, trade or common), makes the use of these terms liable to misinterpretation. This is particularly so when a chemical name is used and has to be communicated by radio or telephone. The incorrect transmission of a single letter can drastically alter the apparent properties of the materials as in the case of Cyclohexanone ($C_6H_{10}0$) and Cyclohexenone (C_6H_80). The former is the less flammable but cannot be extiguished with water.

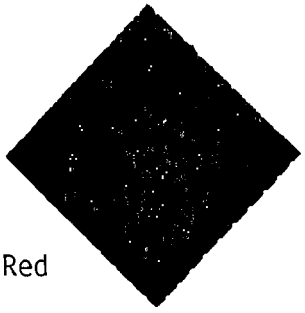
A solution to this problem which has been adopted by all three systems is to use the four digit UN number. This is precise, internationally recognised, reliably transmitted and readily decoded. An alternative to this should not be considered.

Figure 2



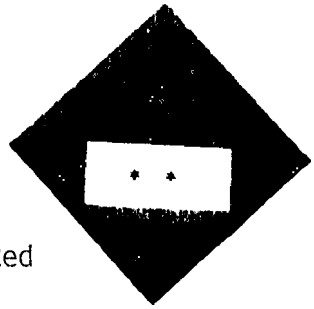
Sample display of UN number on transport units (see 7.4.4)

ALTERNATIVE 2



Red

ALTERNATIVE 1



Red

* Location of class number
** Location of UN number

* Location of class number
** Location of UN number

Two systems display additional information to the UN number. This is a three digit number which, when decoded, informs the user of the hazard rating. The provision of such a properties code is only of limited value, though, as it offers no advice as to what should done in an emergency.

The UK HAZCHEM[1] system offers further information in the form of a telephone number for further advice and an action code that covers protective clothing and breathing apparatus requirements, fire fighting methods, disposal methods and evacuation recommendations. This information should be available from an emergency information centre but if communications are not available these would be of little help. In addition to this, the individual member of the emergency services teams are able to decode the action code themselves from their HAZCHEM cards and this undoutedly improves their confidence in dealing with an emergency when their orders coincide with their own evaluation of the situation. The use of the system requires that labels are attached to both sides of packaged and at the rear so that at least on remains visible in any post-accident configuration. This system has attracted much support by countries. Because of this and its safety attractions it has been included in forthcoming regulations under the Hazardous Substances Act. A major issue concerning its use is the re-

Source

1. Hiliman, J. C. Transportation of hazardous materials-report on overseas study tour to the UK, Holland and USA 1980.

sponsibility for supplying the labels. For a tanker carrying only a single product this presents no difficulty but for multipurpose tnakers or general load carriers this can present a major problem. It would seem reasonable to require the suppliers of the products to supply the labels as well as it is only they who have the advice telephone number and the knowledge to assign the correct labels to the products. Stocks of labels could then be held at depots and other outlets for issue at time of loading. This is contrary to current UK practice but appears a far more satisfactory solution to the problem.

3.2. Container

The container of a hazardous material must be able to contain that substance securely without loss during routine handling and distribution. Furthermore it should be sufficiently protected to withstand moderate impacts and the effects of adverse weather without loss of or damage to contents.

In the case of a tanker or tank-trailer this requires that the vessel be protected against the effects of a roll-over or side impact. This protection must extend to pipework and valves if the unit as a whole is the retain its integrity in an accident situation. A lot of careful thought and design work has gone into ways of making tanks

comply with these requirements. The use of isolating valve and to protect against pipework damage, sidewall cladding for roll-over and impact protection, the use of valve chests and man-hole guards to prevent these items being torn off are but a few examples of what has been achieved. Tank containers that carry their contents under pressure or are subjected to pressure during loading or unloading are required to undergo periodic inspections. Atmospheric tanks are not liable to these inspections which, in the case of hazardous materials, would appear a considerable oversight on behalf of the authorities.

The design standards to which tanks are to built in Saudi Arabia must to be comply international requirements, for example the UK BS standard and others to no standard at all. The requirements for ring stiffeners, stress relieving, X-ray ecamination of welds and the materials used are often dictated by customer.

Casual observation indicates that a large percentage, if not the majority, of sea transported hazardous materials are carried in containers other than tanks. Recent incidents involving 220[1] litres drums of cyanide and cuastic soda confirm the popularity of this particular type of container but there are many other forms used-sylinders for compressed gases, sacks for dry granular materials,

Foot note

Source 1. Proposaltion the dangerous substance regulation 1980. Second consultative document, HMSO 32, London, 1980.

tins and cans of all sizesfor paints, solvents and oils, carboys for aceds, jars for pharmaceuticals, plasticware for consumer chemicals etc. Most of these containers are standard market items, mass produced and freely available. What is alarming is that very few are manufactured to any proved specification for the task they are expected to perform.

3.3. Vehicles-Tankwagons

It is essential that vehicles used for the carriage of hazardous cargoes are suitable for there purpose, safety operated and properly maintained. The cuases of any accident can be apportioned between there causative factors human, environmental and vehicle. The human factor is primarily responsible in over 80 percent of accidents and driver training is the only way to reduce these element. The environmental factor is dependent on sea layout, road layout, signing, signalling and weather condition. The code of practic for the transportation of maximum height for centre of gravity, battery isolation switches, fire protected cabs, restricted exhaust pipe configurations, etc. Many of these, though, are only relevant to flammable liquids. Balanced braking systems underride protections, steering stabilizers, anti-jack-knife devices, stability sensors, automatic tyre pressure indicators and brake retarders are just a few of the many otehr options available to vehicle owners either as original equipment or on modification.

There is considerable disagreement amongst vehicle operators as to the majority should at least be considered and a few of them possibly made compulsory for the carriage of hazardous materials. The neglect aspect can lnly be eradicate by introducing minimum standards of maintenance and periodic inspection. The carriers of flammable liquices have to obtain a certificate-of-fitness for their venicless every six month or every year. Test procedures need to be standardised and the quality of inspections improved if the complaints voiced about current test centre performance are justified.

3.4. Railwagons

It is essential that rail wagons used for the carriage of hazardous cargoes are suitable for that purpose, safely operated and properly maintained. The causes of any accident can be portioned between three causative factors: human, environmental and rail-wagons and more restricted regulation to keep railwagons up standard to the international rules to avoid any accident to pollute the marine environment.

I said that because in future the inter model transportation between the Gulf state well expand for that reason the Authority have to support this prograses by adapting the international regulation in these matter.

3.5. Precaution and Procedures In Case of Emergency

Dangerous Goods must be carried in safe condition according to I.M.D.G. Code and Bulk Chemical Code but in the case of any spill, damage or emition of vapour or gases of the Dangerous Goods which creates any danger for the environment the general precautions are taken.

People who are dealing with the chemicals who are treating the spill must be protected with a suitable clothing and preathing apparatus if necessary, also who are not protected with these equipment must be evacuated from the area emidiatly, all sources of fire or ignition must be taken away, calling fir pregade if necessary and in the same time the experts be in the place to deal with the spill for example to neutralized or useing suitable solvent or absorbent for chemical difficult to be collected but for gases easy dissolved in water can be sprayed with water to absorb them and to prevent their diffusion to the environment then can take it to the contingency planing in the area if possible and must done this job by experts who know the concentration of pollution in the water and air to prevent dangerous of chemical such as toxic, flamabil and irradiation effects ... etc.

Source:

1. Sea Transport of liquid chemicals in bulk 1982 Bo Bentsson and AB Inmar.
2. Transport of dangerous goods at sea Henning Brathaug 1984.

3.6. Incident Reporting

A prerequisite for assessing the benefit from any new controlling measure, or indeed identifying the requirement for such a need in the first place, is to have access to sufficient incident data to enable comparisons to be made and/or problem areas to be identified.

In Saudi Arabia, data on hazardous material incidents currently exist in the form of company records. Most companies maintain such records as a part of their loss prevention schemes but because they are not suitable as a data source in their current form. In addition to these, many minor carriers of hazardous material either do not maintain any records of incidents of concentrate on the ship or vehicle and property damage aspects of accidents as opposed to the results of any product losses.

Some standardized form of incident reporting is the refore necessary of an accident evaluation to be made of the current situation regarding such incidents and the effectiveness of controlling measures is to be monitored.

The layout and content of the required reporting form has not been decided upon out current practice overseas, especially in the USA, provides some useful guidelines. Appendix A is a copy of one used in the USA which is supplied together with an explanatory guide for its complettion by the US DOT. The form is designed for ease

of completion by the user and, more importantly, for compatibility with computer coding techniques. The US DOT have a data bank containing details of all hazardous material incidents since 1972 and this information can be presented in a variety of ways depending on the need of the user. The system enables one to pinpoint such things as the commenest cause of incidents, the most involved hazardous material, the most involved type of container, the death or injury record of a preventive action and the assessment of product risk alreadily obtained with the use of this facility.

The UK has also put forward a proposal for the notification of dangerous occurrences. The information required in it is mainly orientated towards details of employee injury or death and appears to be of limited value for the collation of hazardous material incident details. The UK home office carried out a pilot study in 1977 during which the country fire services were required to report all incidents involving hazardous materials on a standard report form (see Appendix B).

Source:

1. Guidelines for reporting incidents involving dangerous goods in packaged form IMO, MSC/Circ. 360, 1980.
2. The transport of hazardous materials J.C. Hillman 1981.

3.7. Chemicals Carried in Bulk Carriers

Some of the noxious liquids and gases are carried in bulk form, liquid substances which have avapour pressure liss than 2.8 kp/cm² at 37.8 C^{O} are carried by the bulk chemical carriers according to the International Bulk Chemical Code and modern tanker must be constructed in accordance with this Code. This Code is appended with a list of hurmful substances which are devided in to four categbories according to their harmful effect on the aguatic life, the human health, the aminities, and the legitimate uses of the sea. Category A contain chemicals which are bioaccomolated and liable to produce a major hazard to the human health and aquatic life with Threshold limit value $1<TL_m\leqslant 10_{ppm}$ because of their special characteristics.

Category B substances which are bioaccomolated for one week or less or produce tainting of the sea food, or moderate toxic to aquatic life with $TL_m>1_{ppm}$ and less than 10 ppm and some otehr substances with $10_{ppm}<TL_m<100_{ppm}$ because of their special characteristics.

Category C substances which are slightly toxic to aquatic life with with 100 ppm $<TL_m<100_{ppm}$ and additionally contain substances which are partically non-toxic to aquatic life with $100_{ppm}<TL_m\leqslant 1{,}000_{ppm}$ because of their special characteristics.

Category D non-toxic substances to aquatic life with $100_{ppm}<TL_m<1{,}000_{ppm}$

or causing deposits blanketing to the sea floor with high biochemical oxigen demand or highly hazardous to human health with LD_{50} more than 5 mg/kg and less than 50 mg/kg and produce slight reduction to aminities. Each of the categories are carried in special built carries with a certain necessary equipments and specification according to the code and Annex II of International Marine pollution 1973/78 designed to reduce and to prevent such pollution because of the high hazard of those chemicals.

Every ship carrying noxious substances in bulk must be provided with record book, in which all operations must be registered. The stringent restriction which forbiden the discharge of these chemicals in the sea water according to the code and Annex II of MARPOL 73 minimized the pollution of noxious substances in the coasts of Saudi Arabia specially in the Red Sea and Arabian Gulf. Liquid substances which gave avapour pressure more than 2.8 kp/cm^2 at 37.8 C carried with gases on good gas carriers according to the gas bulk code of 1975 to reduce their hazardous effect to the marine environment and human health specially after any collegen or grownkin the tabk which carry these chemicals must resist to a certain pressure and to be form an inert material to these chemicals in addition these tanks and all piping and equipments must be well fitted to prevent any likege. Also must comply with Code in all requirement.

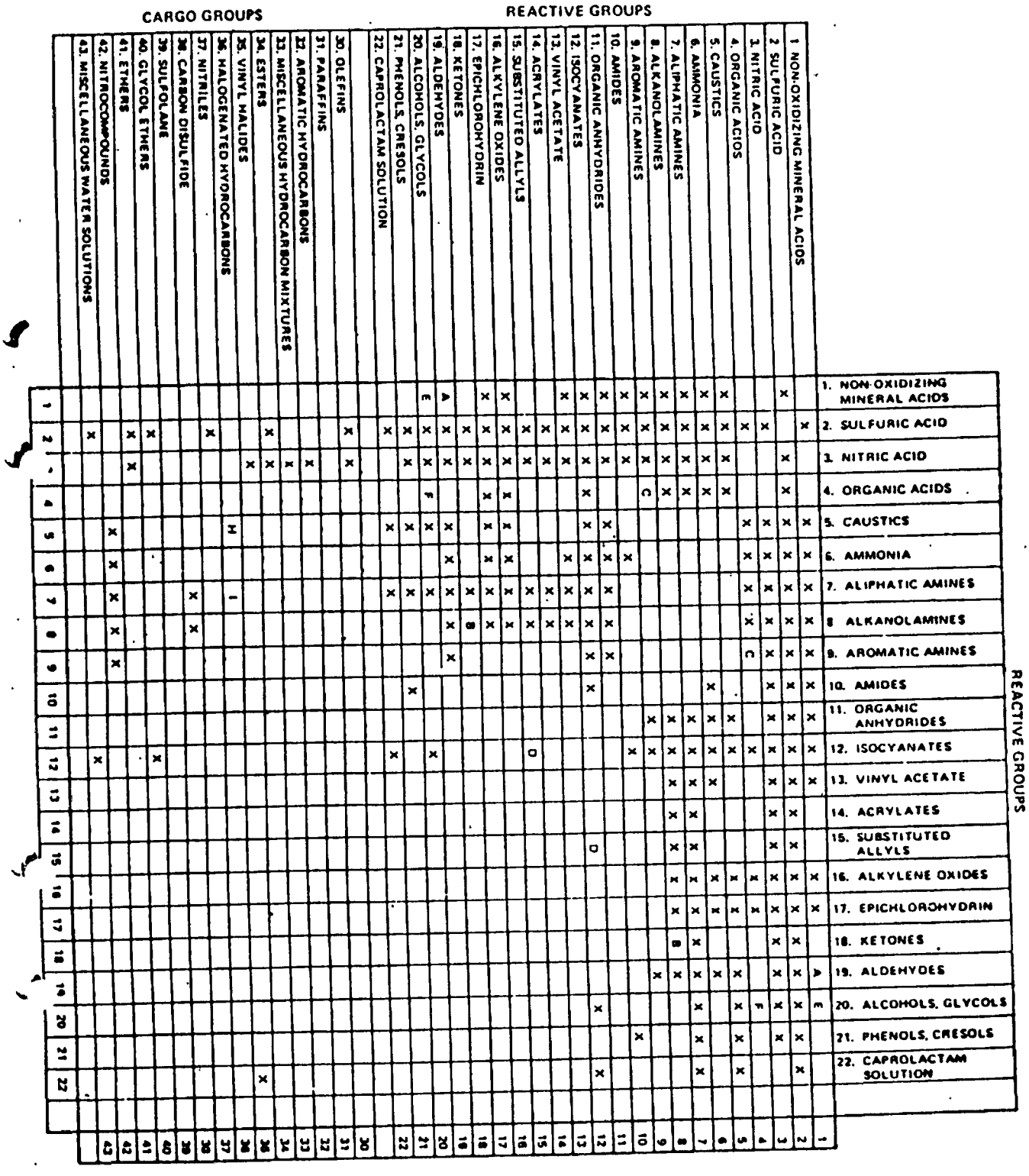
The Kingdom of Saudi Arabia adopted these Code and regulation in

here national maritime regulation and to stablish the necessary facilities in its ports to be apart of MARPOL 73/78.

3.8. Compatibility

The complete separation of the reactive group in the Port of Kingdom of Saudi Arabia is more important. Also separation of piping system so that all product cannot inadvertently be pumped into another, all this procedures make more security and avoid any harm to the working and marine environment, by using all information for protection in Ports. For example such this separation shown in fig. 3.

Figure 3- Compatibility chart



BILLING CODE 4910-14-C

IV. CONCLUSION

4.1. Proposal to Establish the Chemical/Product, Tanker Waste Reception Facilities in Ports

Oil refineries are a common sight near every port of Saudi Arabia and these refineries are built for dealing with large amount of oils (due to economy of scale).

It is hoped that in the very near future these refineries will develop oil reception facilities for the ports of Saudi Arabia. Since this is obviously the most economical way.

My paper suggest that, while the Kingdom of Saudi Arabia, is on the way to planning such facilities, they should also plan a section for hazardous chemical waste (chemicals and water mix) reception facility within the refinery. The same pipe line could be used to bring chemical water mix to the reception facility. As precaution against corrosive liquids Acid/Alkali test could be performed on the vessel by a cargo supervisor (port or Government employee). These cargo supervisors should be trained for handling the hazardous materials (as suggested in 4.4 training of personnel). Even to a government surveyor should prepare standard operating procedures for these cargo supervisors from time to time. Average discharge of water chemical mix from product chemical tankers in Gulf ports is 890,000 m^3/year (1).

A brief chart shows the various functions of this reception facility.

Function	Explanation
1. Lab, test	Before pumping water mix a test to be carried out (safeguard for pipe line) more water to be mixed if necessary.
2. Removal	Through existing oil refinery piping arrangements.
3. Mixure analyses and treatment	At refinery the arrangements to be made for sample analysis and treatment to make it harmless.
Incineration if required	If require certain residues to be burnt.
4. Disposal of remains	Disposal of ashes or other remains (Harmless Water) to be carried out.

Source.

1. IMO/UBDP Seminar London 1984 S. Fukuoka. NIppon K. K. K. Japan.

4.2. Apropusal for Ratification MARPOL 1973/78 and SOLAS Protocol 1978

The Kingdom of Saudi Arabia is a party to the Oil Pollution Convention of 1954 with later amandments and the motive for ratifying that convention was undoutedly a general will to contribute to the protection of the marine environment against oil pollution. The same

philosophy is the basis for the MARPOL 73/78 as expressed in the preamble to that convention.

Annex I/II "Regulations for the Prevention of Pollution by oil and noxious substances" of the MARPOL 73/78 with amendment, implies among other things:

Stricter rules for discharge.

Requirement for an International Oil Pollution protection certificate in documentation of the technical requirements of the convention to be complied with Regulation concerning reception facilities (which has been discussed in 4.1).

Saudi Arabia is not only a producing country, but is simultaneously a big shipowning nation. Her vessels carry oil, chemicals or dangerous goods to and from the veriors parts of the world. As a party to the MARPOL 73/78, our vessels will have to comply with the international regulations. As soon as Annex Ii comes into force most of our vessels and personnel working in our ports (dealing with such cargo) must comply with the regulations. Vessels belonging to the states which have not yet ratified, are exposed to the regulation contained in Article 5 and 4 of the convention which reads:

With respect to the ships of non-parties to the Convention, Parties shall apply the requirements of the present Convention as may be necessary to ensure that no more favourable treatment is given to

such ships.

Since the antipollution organizations (cleaning up organization) and personnel are very scarce in Saudi Arabia, it is in her best interest that the MARPOL 73/78 and SOLAS Protocol 78 be ratified as soon as possible, this will reduce the chance of oil spill to the minimum in her region, thereby minimising any possible damage to her marine resource and marine life.

The First step for this job will be make "Saudi Maritime Laws" which must be in harmony with "Saudi National Legislation" and should incorporate the requirements of the MARPOL 73/78 conventions. The second step should to give instruction to surveyors to prepare documents/certificate according to "Saudi Maritime Law". The third step will be to exercise control according to "Saudi Maritime Law". Lastly the ratification of MARPOL 73/78 can be effected.

In conclusion it is recommended that the Kingdom of Saudi Arabia ratifies the MARPOL 73/78 Conventions in entirety and starts excisting the countrol over vessels calling in her ports.

4.3. Proposal for Maritime Contingency Planning

It is the policy of the Kingdom of Saudi Arabia that the exploration of oil and handling of oil and other harmful substances be

carried out in such a manner as to minimise the risk of environmental or economic damage or threat to public health.

Swift and effective action should be taken as and when desired by any such situation.

The "environmental protection co-ordinating committee (EPCCOM) of Saudi Arabia operates under the directive of the Deputy Prime Minister of the Kingdom EPCCOM has already proposed a "National Contingency Plan for combating pollution by oil and other harmful substances. The plan is attatched to this paper for ready referance, as Appendix C. However, the emphasis of this plan is on oil pollution.

It is interesting to know that the personnel engaged for containgency planning of "chemical and other harmful substances are more or less the same as those for the combat of oil pollution. Since the Port Authorities will not employ people separately for this purpose. Most ports of the world give emergency training to their existing staff of the cargo handling division.

Only one Commander need to be appointed as per requirement of the accident. However, if the person is also trained to have enough experience and academic knowledge of chemical and hazardous substances the same person could command both operations (oil pollution or chemical pollution).

It is proposed her that the port personnel be trained for combating

of both chemical pollution situations (as discassed in 4.4. Training Personnel).

Then either the contingency plan could be merged with the already existing plan for the oil pollution or the areas (ports) where chemicals and other dangerous goods are handled could have separate contingency plans drawn on the same lines as in Appendix C.

4.4. Training of Marine Personnel and Qualification of Persons In-charge of Carriage, Handling and Stowage of Dangerous Goods in the Ports of Kingdom of Saudi Arabia

Presently there are only foreign nationals working in the various dangerous goods capacities in Ports of Saudi Arabia if they are replaced by national employees, Approximately 200 persons will need to be given a two-month training course arranged in a five year plan.

The training of personnel should be given in the nearest appropriate training facility so that the trainess have no need to leave their home country, and their progress can be easily and economically monitored.

The training should be given for a two month period on the latest knowledge prevailing at the time of the course.

The requirements for various courses are recommended in various IMO Conventions, namely International Conference on Training and Certification of seafarers, 1978. However, an out line of the Dangerous Goods course and the basic entree qualifications are given below.

1. Entry status (for Port Employees or Seafarers)

   a) Age 18 years and above

   b) Medical fitness (as per Government requirement)

   c) 12 classes passed (Saudi High School Certificate) with Phesics, Chemistry, Mathematics

   d) General out line of the skills and knowledge imported during training should be as follows:

1. Elementary Chemistry: Organic and Inorganic Substances, Chemical reactions, Catalitic and metabolic actions, and knowledge of commonly used Chemicals, Appendix D attached to this paper describes, the elements of requirement and carriculum for a "Chemical Tanker Familiarization Course". These courses are already in use by Federal republic of Germany.

Considering the standards of basic education and language problems which are generally faced by our students abroad, the time duration for these courses maybe doubled. A three months or one complete voyage sea service on a chemical tanker may also be introduced between the two courses explained in Appendix D.

APPENDIX A

HAZARDOUS MATERIALS INCIDENT REPORT AS REQUIRED BY THE U S DEPARTMENT OF TRANSPORT

DEPARTMENT OF TRANSPORTATION

Form Approved OMB No. 04-S613

HAZARDOUS MATERIALS INCIDENT REPORT

INSTRUCTIONS: Submit this report in duplicate to the Director, Office of Program Support, Materials Transportation Bureau, Department of Transportation, Washington, D.C. 20590, (ATTN: DMT-412). If space provided for any item is inadequate, complete that item under Section H, "Remarks", keying to the entry number being completed. Copies of this form, in limited quantities, may be obtained from the Director, Office of Program Support. Additional copies in this prescribed format may be reproduced and used, if on the same size and kind of paper.

A INCIDENT

1. TYPE OF OPERATION
1 ☐ AIR 2 ☐ HIGHWAY 3 ☐ RAIL 4 ☐ WATER 5 ☐ FREIGHT FORWARDER 6 ☐ OTHER (Identify) _____

2. DATE AND TIME OF INCIDENT (Month - Day - Year)
_____ a.m. / p.m.

3. LOCATION OF INCIDENT

B REPORTING CARRIER, COMPANY OR INDIVIDUAL

4. FULL NAME

5. ADDRESS (Number, Street, City, State and Zip Code)

6. TYPE OF VEHICLE OR FACILITY

C SHIPMENT INFORMATION

7. NAME AND ADDRESS OF SHIPPER (Origin address)

8. NAME AND ADDRESS OF CONSIGNEE (Destination address)

9. SHIPPING PAPER IDENTIFICATION NO.

10. SHIPPING PAPERS ISSUED BY
☐ CARRIER ☐ SHIPPER
☐ OTHER (Identify) _____

D DEATHS, INJURIES, LOSS AND DAMAGE

DUE TO HAZARDOUS MATERIALS INVOLVED

11. NUMBER PERSONS INJURED

12. NUMBER PERSONS KILLED

13. ESTIMATED AMOUNT OF LOSS AND/OR PROPERTY DAMAGE INCLUDING COST OF DECONTAMINATION (Round off to dollars)
$

14. ESTIMATED TOTAL QUANTITY OF HAZARDOUS MATERIALS RELEASED

E HAZARDOUS MATERIALS INVOLVED

15. HAZARD CLASS (*Sec. 172.101, Col. 3)	16. SHIPPING NAME (*Sec. 172.101, Col. 2)	17. TRADE NAME

F NATURE OF PACKAGING FAILURE

18. (Check all applicable boxes)

☐ (1) DROPPED IN HANDLING	☐ (2) EXTERNAL PUNCTURE	☐ (3) DAMAGE BY OTHER FREIGHT
☐ (4) WATER DAMAGE	☐ (5) DAMAGE FROM OTHER LIQUID	☐ (6) FREEZING
☐ (7) EXTERNAL HEAT	☐ (8) INTERNAL PRESSURE	☐ (9) CORROSION OR RUST
☐ (10) DEFECTIVE FITTINGS, VALVES, OR CLOSURES	☐ (11) LOOSE FITTINGS, VALVES OR CLOSURES	☐ (12) FAILURE OF INNER RECEPTACLES
☐ (13) BOTTOM FAILURE	☐ (14) BODY OR SIDE FAILURE	☐ (15) WELD FAILURE
☐ (16) CHIME FAILURE	☐ (17) OTHER CONDITIONS (Identify)	19. SPACE FOR DOT USE ONLY

Form DOT F 5800.1 (10-70) (9/1/76)
*Editorial change to incorporate redesignation per HM-112.

G **PACKAGING INFORMATION** - *If more than one size or type packaging is involved in loss of material show packaging information separately for each. If more space is needed, use Section H "Remarks" below keying to the item number.*

	ITEM			#1	#2	#3
20	TYPE OF PACKAGING INCLUDING INNER RECEPTACLES *(Steel drums, wooden box, cylinder, etc.)*					
21	CAPACITY OR WEIGHT PER UNIT *(55 gallons, 65 lbs., etc.)*					
22	NUMBER OF PACKAGES FROM WHICH MATERIAL ESCAPED					
23	NUMBER OF PACKAGES OF SAME TYPE IN SHIPMENT					
24	DOT SPECIFICATION NUMBER(S) ON PACKAGES *(21P, 17E, 3AA, etc., or none)*					
25	SHOW ALL OTHER DOT PACKAGING MARKINGS *(Part 178)*					
26	NAME, SYMBOL, OR REGISTRATION NUMBER OF PACKAGING MANUFACTURER					
27	SHOW SERIAL NUMBER OF CYLINDERS, CARGO TANKS, TANK CARS, PORTABLE TANKS					
28	TYPE DOT LABEL(S) APPLIED					
29	IF RECONDITIONED OR REQUALIFIED, SHOW	A	REGISTRATION NO. OR SYMBOL			
		B	DATE OF LAST TEST OF INSPECTION			
30	IF SHIPMENT IS UNDER DOT OR USCG SPECIAL PERMIT, ENTER PERMIT NO.					

H **REMARKS** - Describe essential facts of incident including but not limited to defects, damage, probable cause, stowage, action taken at the time discovered, and action taken to prevent future incidents. Include any recommendations to improve packaging, handling, or transportation of hazardous materials. Photographs and diagrams should be submitted when necessary for clarification.

31. NAME OF PERSON PREPARING REPORT *(Type or print)*	32. SIGNATURE
33. TELEPHONE NO. *(Include Area Code)*	34. DATE REPORT PREPARED

Reverse of Form DOT F 5800.1 (10-70)

APPENDIX B

INCIDENT REPORT USED FOR 1977 U K HAZARDOUS MATERIALS ACCIDENT SURVEY

INCIDENT REPORT
INCIDENTS ARISING FROM THE CONVEYANCE OF DANGEROUS GOODS

1. Name of Fire Brigade/Service: .....
2. Date and Time of Call: .....
3. Location of Incident: .....
   .....
4. Cause of Incident: .....
   .....
5. Brief Description of Incident: .....
   .....
   .....
6. No of Casualties: Fatal ..... Injuries .....
7. Brief Details of any Damage to Property due to Nature of Chemical(s) involved:
   .....
   .....
8. Approximate Quantity of Chemical Spilled: .....
9. Were Chemicals and/or Container Involved in Fire? YES/NO
10. Brief Details of any Emission of Fumes (including direction of travel and area affected):
    .....
    .....
11. Type of Container Involved:*
    Simple Tank Load ☐ Multi-compartmented Tank Vehicle ☐
    Drum ☐ Package ☐ Other (specify) .....
12. Names of Product(s) Involved: .....
    .....
    .....
13. Name and Address of Chemical Company whose Products Involved: .....
    .....
14. Details of Markings on Product:*
    UK THIS ☐ Product Name ☐ Tele No for specialist advice ☐
    Hazard Warning Diamond(s) ☐ None ☐ Other (specify).....
15. Written Instructions Accompanying Product:*
    Tremcard ☐ None ☐ Other (specify) .....
16. Was Specialist Assistance Requested: YES/NO
17. If yes to 16, from Where Was the Advice Obtained: .....
    .....
18. Was the Chemsafe Scheme Invoked: YES/NO
19. Give Details of Response to Request for Specialist Assistance: .....
    .....
    .....

APPENDIX C

KINGDOM OF SAUDI ARABIA

NATIONAL CONTINGENCY PLAN FOR COMBATTING POLLUTION BY OIL AND OTHER HARMFUL SUBSTANCES

ARTICLE I

TITLE

This plan shall be called The National Contingency Plan for Combatting Pollution by Oil and Other Harmful Substances and is hereinafter referred to as "The Plan".

ARTICLE II

GENERAL POLICY AND OBJECTIVES

a) General Policy

It is the policy ofthe Kingdom of Saudi Arabia that the exploration for oiul and the handling and transportation of oil and other harful substances is to be carried out in such a manner as to minimise the risk of environmental and economic damage or threat to public health. In the event that a spillage does occur, swift and effective action will be taken to minimise the environmental and

public health and welfare risks resulting from that spillage.

b) Objectives

The Plan aims to provide for co-ordinated and swift action to protect the marine environment and coasts of the Kingdom from the effects of spills of oil and other harmful substances by establishing mechanisms that maximise the use of available resources and ensure proper response at the scene of any discharge of oil or harmful substance including the mobilising of equipment, manpower and expertise at a level appropriate to combat such a spill.

The Plan also fulfils the Kingdom's regional obligations expressed in the Protocols Concerning Regional co-operation in Combatting Pollution by Oil and Ohter Harmful Substances in Cases of Emergency of the Kuwait Regional Conference (April 1978) on the Protection and Development of the Marine Environment and the Coastal Areas or any other similar Regional or International obligations in the future.

ARTICLE III

LEVELS OF RESPONSE

a) National Oil Spill Response

MEPA will plan and co-ordinate response activities to control pollu-

tion by oil and other harmful substances in the Kingdom and will:

- formulate national policy in oil pollution control in the Kingdom's marine environment;
- act in accordance with the Kuwait Protocol Concerning Regioinal Co-operation in Combatting Pollution by Oil and Other Harmful Substances in Cases of Emergency (April 1978) or any other similar regional or international obligation in the future;
- undertake surveillance, monitoring and studies necessary for the tracking of oil spills and the determination of oil spill pollution impacts;
- provide national management, administration and co-ordination for the implementation and operational functioning of The Plan;
- co-odinate protection of facilities and sensitive areas against oil spills; and
- provide operational co-ordination in the event of a national spill emergency.

Where the President of MEPA considers that an oil spill requires a national response he shall, with the agreement of the Chairman of the Environmental Protection Co-ordinating Committee, (hereinafter referred to as EPCCOM) have power to take control of the response activity and he may direct the allocation of resources from any Government or Government controlled agencies, as he sees fit, to

assist in surveillance, protection, combat or cleanup activities or stepping up of such activities.

b) Area Oil Spill Response

The activities required to plan for and co-ordinate an Area response to an oil spill will be undertaken within the Western (Red Sea) and Eastern (Arabian Gulf) Regions by MEPA. Staff of these Regions include a Regional Co-ordinator for oil spill response activities in the Region for the supervision of protection and combat activities and co-ordination in the event of spills requiring an Area spill response.

The functions and duties of MEPA's Regional Co-ordinators in respect of oil spills include:

- review and evaluation of Local Contingency Plans for marine and coastal facilities (see Article IV (b) hereunder);
- preparation and development of a comprehensive Area Plan to include the necessary complementary and co-ordination measures to ensure integration and mutual support of local capabilities and to provide additional support from the region;
- area response program management, administration and co-ordination;
- invoking response to an Area Spill;

- review of spill event reports in the Area;
- conducting spill response exercises and co-ordination of training programs;
- coastal and offshore spill surveillance and regulatory compliance monitoring;
- evaluation of combat, surveillance and protection equipment; and
- identification of relevant monitoring programs to be carried out by the coastal and marine facilities.

In the following cases the MEPA Regional Co-ordinator will assume responsibility to co-ordinate spill prevention protection and combat activities:

- in coastal areas outside the boundaries of coastal facilities;
- where the nature of the action required is beyond the capabilities of the local coastal facility; and
- where the magnitude of the spill is classified as "Major" (see Annex i).

In such cases, and as required, the MEPA Regional Co-ordinator may seek, and will be provided with, necessary manpower and equipment from any one or more of the following:

- the Frontier Forces;
- the Saudi Ports Authority;
- any coastal Municipality; and

- any organization having a coastal or marine facility or installation.

(i) Area Operations Committee

To assist MEPA Regional Co-ordinators in planning area response programmes and the allocation of manpower in an emergency; area operations committee are established in each of the Eastern and Western Regions with the following membership:

- the MEPA Regional Co-ordinator for the Region (as Chairman);
- all On-Scene-Commanders from the Region (see Article III (c) hereunder) or representatives of the organizations responsible for these local facilities;
- locally based representatives of:

  the Ministry of Transport

  the Ministry of Petroleum and Mineral Resources

  the Ministry of Municipal and Rural Affairs

  the Saudi Frontier Forces

  the Royal Saudi Navy

  the Saudi Ports Authority

  the General Directorate of Civil Defence

  the Royal Commission for Juabil and Yanbu

  the Saline Water Conversion Commission; and

- any experts, consultants or observers designated by the Chairman of EPCCOM.

c) Local Oil Spill Response

The following organizations having coastal facilities will undertake spill prevention, protection and combat activities within the coastal and marine area affecting the efficient operation of their facility:

- Ministry of Petroleum and Mineral Resources and the associated oil companies;
- Ministry of Industry and Electricity;
- Saline Water Conversion Commission;
- Saudi Frontier Forces;
- Royal Saudi Navy;
- Saudi Ports Authority;
- Royal Commission for Jubail and Yanbu; and
- any other organization having marine or coastal facilities which is designated by MEPA.

Each organization will apoint an On-Scene-Commander who will be responsible for oil spill response within the local facility's area.

Each coastal facility must develop a local oil spill response plan and must maintain a properly trained and equipped Task Force capable of responding to the type and size of spill assessed as appropriate

to the spill risk and sensitivity of the locality in consultation with the Regional Co-ordinator.

ARTICLE IV

AREA & LOCAL PLANS

For the development and implementation of The Plan, Area (Arabian gulf and Red Sea) and Local Plans shall be developed and implemented as follows:

a) Area Plans

An Area Plan provides the standard operational response guidelines and procedures for a Region. The Regional Co-ordinator must develop the plan and submit it to the President of MEPA for approval. The Area Plan should detail the action the Regional Office will take if a spill occurs requiring an Area response. The Area Plan shall include the following:

- a compilation of the Area's Local Plans;
- a surveillance and monitoring system for discovery of oil spills in Saudi waters and the coasts of the Region and for notification of such spills to MEPA;
- a detailed command and communications structure;
- a notification system for alerting members of the Area Operations Committee and MEPA headquarters;

- specific job descriptions for each key position in the response organization;
- identification of local support organizations involved in spill response and key personnel within those organizations;
- upt-to-date inventory of spill response resources within the Area including Government, private and commercially held manpower and equipment;
- communications and logistic procedures for the allocation of resources and manpower from one coastal facility to another;
- listing of critical water use facilities and ecologically sensitive areas and methods to be used to protect them; and
- a survey of potential spill sources and a determination of the maximum credible spill from each;
- instructions for obtaining oceanographic and marine meteorology data and estimating spill trajectories;
- data collection worksheets and instructions on spill event data collection and documentation procedures; and
- description of acceptable containment, cleanup and disposal techniques including instructions for obtaining necessary approvals in particular cases.

b) Local Plans

A Local Plan provides the standard operational response guidelines

and procedures for a coastal facility. It is prepared by the facility in consultation with the Regional Co-ordinator. The Local Plan should detail the action the facility will take if a spill occurs involving facilities or vessels within its area.

the Local Plan shall include the following:

- local organization command and communications structure, including individual names, telephone numbers, radio frequencies and other means of notification of key personnel;
- specific job descriptions for each key position in the facility;
- communication and logistic procedures for deploying manpower and equipment; and
- procedures for notification of the Regional Co-ordinator.

ARTICLE V

RESPONSIBILITIES

The various activities associated with the response to an oil spill are allocated to MEPA and those organizations having responsibility in the area or activity.

a) Implementation

MEPA, in addition to its responsibilities of implementing and co-

ordinating The Plan, will publish policies, regulations and procedures in respect of prevention, control, clean-up and disposal of spills of oil and other harmful substances.

All facilities shall carry out their activities outlined in this Plan from their own budget, except in emergency cases which require capabilities beyond those available in the individual or combined facilities. In these cases use can be made of the emergency funds specified in Article VII (c).

In emergencies MEPA may conclude agreements and contracts with individuals, establishments, companies and organizations, Saudi or foreign, local or international, connected with the purposes of The Plan, to provide immediate support, as required, for surveillance, monitoring, protection and combat and assessment and impact studies. Such agreements and contracts must be approved by the Chairman of EPCCOM.

b) Co-ordination

MEPA will co-ordinate the activities of all other organizations in so far as their activities relate to oil spill response including determining the adequacy of manpower and equipment resources held by the various participating organizations.

c) Surveillance and Monitoring

MEPA will undertake and co-ordinate surveillance and monitoring of the marine economic zone and coastal areas of the Kingdom using

its own resources and funds available under Article VII (a). As required, assistance shall be provided by the Ministry of Petroleum and Mineral Resources, the Saudi Ports Authority, the General Directorate of Civil Defence and the Saudi Frontier Forces.

- Surveillance will includ;
- aerial observation;
- marine observation;
- coastal observation;
- remote sensing;
- oportunistic reports received from militery, civil and private aircraft and shipping; and
- any other practicable means available.

MEPA shall identify all relevant monitoring activities required to be carried out under The Plan by the appropriate organizations.

d) Protection

All organizations having marine or coastal facilities (Article III (c) shall provide adequate manpower and equipment to protect themselves from any type of spill which may be expected to arise from their own or other nearby activities. This equipment shall be continuously maintained so as to be immediately deployable in the event of a spill.

e) Combat

Subject to the environmental specifications and measures provided by MEPA, all organizations having marine or coastal facilities (Article III (c)) will undertake combat of oil spilled within their areas and shall provide and maintain adequate equipment to undertake that task. Outside these areas the Frontier Forces shall be responsible under the supervision and co-ordination of MEPA's Regional Co-ordinator.

f) Cleanup

subject to theenvironmental specifications and measures provided by MEPA, all organizations having marine or coastal facilities (Articel I (c)) will undertake cleanup of oil spilled within their areas and shall provide and maintain adequate equipment to undertake that task. Outside these areas the appropriate Municipality and the Frontier Forces shall be responsible under the supervision and co-ordination of MEPA's Regional Co-ordinator.

g) Disposal

In consultation with affected organizations, MEPA will identity appropriate sites and methods for the disposal of collected oil and oiled debris.

h) Studies

MEPA will undertake, supervise or co-ordinate the conduct of appropriate scientific and other studies relevant to the above activities with a view to facilitating government decisions on matters related to a major spill and increasing the state of knowledge to improve the effectiveness of oil spill response in addition to the assessment of environmental impacts.

ARTICLE VI

OPERATIONAL PROCEDURES

The actions taken to respond to a spill of oil or other harmful substance depend upon many factors including the magnitude and location of the spill.

Response actions in the event of a spill involve the following five phases.

a) Phase I - Discovery and Notification

All organizations having marine or coastal facilities or marine activities such as the Frontier Forces and fishing companies, and all ship captains and aircraft pilots, should report any oil spill observed.

Reports by these organizations, those obtained through search or sruveillance and incidental observations should be notified to MEPA's Regional Co-ordinator where the observer is aware of the procedure, otherwise discoveries should be notified to local On-Scene-Commanders or to port authorities, police, radio or television stations, telephone operators, airtraffic control towers or any available public authority. Personnel at such facilities will be instructed to relay the report promptly to MEPA's Regional Office. Insofar as possible, spill discovery reports and notifications should include the following:

- general description of the spill event;
- identification of the source ofthe spill;
- geographic position, time and date of the incident or observation;
- quantity and type of substance spilled;
- oceanographic and meteorological conditions prevailing in the area; and
- any other pertinent information.

The operator of a coastal facility shall immediately notify MEPA's REgional Co-ordinator if a report is received indicating a major spill event as indicated in Annex 1.

b) Phase II - Evaluation and Initiation of Action

The On-Scene-Commander or operator of a coastal facility shall promtly investigate all spill reports and shall:

- classify the size of the spill, as indicated in Annex 1;
- evaluate the necessity for containment or cleanup action; and
- evaluate the feasibility of various containment or clean-up options.

The MEPA Regional Co-ordinator shall be notified in all cases and immediately if:

- the spill is classified as moderate or major;
- the necessary response is likely to exceed the resource of the facilaity; or
- the spill is likely to have regional or international implications.

MEPA's Regional Co-ordinator will notify MEPA National Headquarters in all cases and immediately if:

- the spill is classified as major;
- the necessary response is likely to exceed the resources of the Region or
- the spill is likely to have regional or international implications.

The On-Scene-Commander or operator of a coastal facility shall endeavour to identify the party responsible for the spill and determine whether that party is taking appropriate steps to control and clean up the spill. If appropriate steps are not being taken he shall:

- endeavour to prevent further discharges from the source;
- advise the discharge of the proper spill response actions and warn of the liability for spill response costs and consequential damages;
- collect appropriate data for cost recovery proceedings and spill response assessment; and
- collect appropriate data to define the proper response procedure.

c) Phase III - Containment and Countermeasures

If the discharger neglects or refuses to take appropriate action or if such action is insufficient to properly combat the oil spill then containment and countermeasure action shall be taken by the On-Scene-Commander. The first priority in such action is to ensure the safety of those involved in the spill, in the response action and athe general public. Spill response then includes:

- control of discharge at source, where possible;
- placement of physical barriers to prevent spread of spill and to protect specific installations or locations;
- damage control and salvage operations; and
- use of chemical agents to disperse or restrain spread of the spill in areas where their use is not pronibited by MEPA.

The On-Scene-Commander of a coastal facility may request the MEPA

Regional Co-ordinator to provide assistance from other coastal facilities, various Government and private organizations and the MEPA REgional Office staff, if necessary.

d) Phase IV - Cleanup and Disposal

The On-Scene-Commander of a coastal or marine facility shall as soon as practicable begin operations to recover the spilled oil or harmful substance from the water or shore areas using such methods as skimmers, sorbents, dredges and earth moving equipment, and other appropriate means. The Local and Area Plans will guide the On-Scene-Commander or operator in determining priority areas for cleanup and locations for disposal of recovered material.

e) Phase V - Documentation

During all phases of a spill response the On-Scene-Commander or operator shall ensure that appropriate data and documentation are collected for later identification of responsible parties, cost recovery, evaluation of spill response effectiveness, and research into environmental impacts. Documentation should include films and photographs, statements of witnesses, completed forms letters, telexes, contracts, field notebooks, sample collection and analysis data, new releases and reports, communications logs etc.

As soon as possible after conclusion of a moderate or major spill response, and no longer than thirty days after, the On-Scene-Commander

or operator shall submit a complete report to the MEPA's Regional Office describing the development of the spill event, the actions taken, resources committed, costs incurred and problems encountered.

f) Escalation of Response

Where the On-Scene-Commander or operator considers that a spill requires action beyond the resources of his facility, he shall so advise MEPA's Regional Co-ordinator who shall notify members of the Area Operations Committee and convene the Committee if necessary.

MEPA's Regional Co-ordinator may allocate resources from other coastal facilities, and from various Gopvernment and private organizations, to assist the On-Scene-Commander or operator in combating the spill. At his discretion, and as conditions warrant, MEPA's Regional Co-ordinator may designate a substitute On-Scene-Commander who will assume the full responsibilities and authority of the On-Scene-Commander.

MEPA's Regional Co-ordinator shall keep MEPA informed of any aspects of the spill event which may have regional or international implications.

MEPA's National Headquarters shall determine whether the spill constitutes a "Marine Emergency" under the Protocols of the Kuwait Regional Agreement or any similar regional or international obli-

gations and if so, shall notify the appropriate Regional Marine Emergency Mutual Aid Centre and keep that Centre properly informed of developments.

ARTICLE VII

FUNDING

Funds for the implementation of The Plan will be provided from the Kingdom's General Treasury, in consultation with the Agencies concerned, and shall include:

a) MEPA Allocation

An operational allocation provided within the annual budget of MEPA.

b) Other Allocations

Allocations within the budgets of various government agencies identified by The Plan as required to participate in oil spill response activities; it being the responsibility of each such agency to seek is own allocation.

c) Emergency Funds

An emergency budget of SR 100 million maintained continuously at the disposal of His Royal Highness the Chairman of EPCCOM to be used for response activities outlined in Articles III (a) and V (a)) of The Plan.

ARTICLE VIII

GENERAL

Manpower and equipment necessary to be Brought into the Kingdom to asist during the combat of a spill shall be exempted from visa and customs procedures as the case may be, other than customs security checks, on the written request of the President of MEPA. The Ministry of Foreign Affairs, the Ministry of the Interior and the Department of Customs shall issue instructions to ensure that delays are eliminated in such circumstances.

ARTICLE IX

REVIEW AND UPDATING

As The Plan must cover evolving and new conditions, it may require variations or modifications from time to time. MEPA shall be responsible for periodic review, and shall make such recommendations as it considers necessary for approval of the Chairman of the EPCCOM who shall have the power, duty and responsibility at any time to approve any amendments or additions to The Plan other than an amendment to Article VII (c), which will require the prior approval of the Prime Minister.

ARTICLE X

INTERPRETATION

The interpretation of The Plan lies with the Chairman of the Environmental Protection Co-ordinating Committee.

ANNEX 1

CLASSIFICATION OF SPILLS

The following classification of spill magnitude provides a guide to the appropriate level of response.

(i) Minor Spill

A minor spill is a discharge to sheltered port or nearshore waters of less than 5,000 litres (25 bbl) of oil; or a discharge to offshore waters of less than 50,000 litres (250 bbl) of oil; or a discharge of a harmful substance in a quantity less than that defined by MEPA as reportable.

(ii) Moderate Spill

A moderate spill is a discharge to sheltered port or nearshore waters of 5,000 to 50,000 litres (25 to 250 bbl) of oil; or a discharge to offshore waters of 50,000 to 500,000 litres (250 to 2,500 bbl) of oil; or a discharge of a harmful substance in a quantity equal to or greater than that defined by MEPA as reportable.

(iii) Major Spill

A major spill is a discharge to sheltered port or nearshore waters of more than 50,000 litres (250 bbl) of oil; or a discharge to offshore waters of more than 500,000 litres (2,500 bbl) of oil; or a discharge of a harmful substance that poses a significant threat to public health or welfare or results in widespread concern.

In the above classifications, nearshore waters means within 20 kilometres of any mainland or island shoreline.

These classifications are not intended to directly correspond to associated degrees of hazard to public health or welfare, nor as a direct measure or potential environmental damage. Any discharge that poses a significatn threat to public health or welfare, or to ecological systems of substantial biological, ecnomic or aesthetic value, shall be classed as a major spill irrespective ofthe quantities released. Furthermore, any spill likely to give rise to regional or international implications shall be classified as a major spill.

APPENDIX D

CONSIDERATIONS, PROVISIONS, SYLLABUS OF THE CHEMICAL TANKER FAMILIARIZATION COURSE AND SYLLABUS OF AN ADVANCED SPECIALIZED TRAINING COURSE ON CHEMICAL TANKER OPERATION

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Considerations, Provisions and Syllabus of the Chemical Tanker Familiarization Course

A Considerations

The STCW-Convention determines Requirements for the Training and Qualification of Masters, Officers and Ratings of Chemical Tankers.

General Certification

Shore-based Fire Fighting Course

Chemical Tanker
Familiarization Course

Appropriate period of
supervised Shipboard Service

Service on Chemical Tankers with
Specific Duties in Connection with
Cargo and Cargo Equipment

Relevant Experience on Chemical
Tankers appropriate to Duties

Specialized Training Programme
(Advanced Chemical Tanker Operation Course)

Service on Chemical Tankers with
immediate Responsibility for
Cargo Operations

Training Scheme for Chemical Tankers Staff

The Training Programme, which is dealt with in the following, is required by Regulation V/2 of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978:

"1. Officers and Ratings who are to have specific duties, and responsibilities related to those duties, in connexion with cargo and cargo equipment on chemical tankers and who have not served on board a chemical tanker as a part of the regular complement, before carrying out such duties shall have completed an appropriate shore-based fire-fighting course; and

a) an appropriate period of supervised shipboard service in order to acquire adequate knowledge of safe operational practices; or

b) an approved chemical familiarization course which includes basic safety and pollution prevention precautions and procedures, layouts of different types of chemical tankers, types of cargo, their hazards and their handling equipment, general operational sequence and chemical tanker terminology."

B. Provisions

Course level: Familiarization Course

1. Essential Equipment

1.1. Overhead projector

Slide projector

appropriate transparancies and slides

Charts and Diagrams

1.2. Gas Detector sets

Explosimeter

Oxygen Analyser

Protection suits (fire, chemicals)

Excape and Reuscitation equipment

Fire-fighting equipment

Plain Chemical Experimental devices

1.3. International Dangerous Goods Code (IMCO)

Chemical Tanker Safety Guide (ICS)

Code for Construction and Equipment of Ships Carrying Dangerous Goods in Bulk (IMCO)

Shipbuilders and Manufacturers Guides and Handbooks

Coating Compatibility Schedules

Chemical handbooks and dictionaries

Fire-fighting manuals

Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (IMCO)

Total estimated cost: 6,000 US dollar

2. Desirable Equipment

2.1. Film projector
Video tape recorder
appropriate films and tapes

2.2. ShipsDesign and Equipment models and patterns

2.3. Chemical laboratory
Total estimated cost: 15,000 US dollar

3. Teaching Personnel

The personnel should consist of each a
Chemist or Chemical engineer
Master mariner
Marine engineer
both the latter with chemical tanker experience.

4. Number of participants

To obtain an intensive training, the number of participants should not exceed 12.

5. Duration of a course

The duration of an course should be 10 working days (2 weeks) with six lectures of 60 minutes per day.

C. Syllabus: CHEMICAL TNAKER FAMILIARIZATION COURSE

COURSE CONTENTS	NO. OF LESSONS	AIDS AND MATERIAL	REFERENCES
1. Ship Design and Equipment	12	Manufacturer's Manuals and construction plans	Codes for the Construction and Equipment of Ships carrying Dangerous Goods in Bulk (IMCO); Classification rules; Chemical Tanker Safety Guide (ICS)
1.1. Codes and regulations concerning Chemical Tanker Construction, equipment and classification			
1.2. Tank arrangements			
1.3. Tank coatings			
1.4. Pipeline and pumping systems			
1.5. Tank cleaning and venting facilities			
1.6. Electrical equipment			
2. Cargo Properties and Reactions	14	Chemicals experimental equipment; Periodic table; Vapour pressure diagrams; physical and chemical data tables; MAC- or TLV-tables	International Maritime Dangerous Goods Code (IMCO) Chemical dictionaries and data handbooks;
2.1. Physical properties, especially specific gravity, vapour pressure and density, partial pressure, boiling temperature, diffusion, flashpoint, autoignition temperature, flammable limits, viscosity, electrostatic charge generation			
2.2. Chemical properties and reactions, especially chemical structure, symbols and nomenclature, chemical groups, reaction conditions, interaction, catalysis, polymerization, inhibitors, reactions with water and air			
2.3. Toxicity of chemicals, toxicity limits (MAC, TLV, LD_{50})			
2.4. Identification of chemicals; Utilization of chemical dictionaries, handbooks and codes; determination of properties			

COURSE CONTENTS	NO. OF LESSONS	AIDS AND MATERIAL	REFERENCES
3. Operational Procedure 3.1. Loading and discharging 3.2. Cargo calculation and stowage 3.3. Tank cleaning and gas freeing 3.4. Ship/Shore communication, port regulations 3.5. Safety control	14	Ships tank and lines arrangeemnt plans; Manufacturers data handbooks; pump diagrams; electronic calculators; segregation tables; coating compatibility charts; port regulations	Chemical Tanker Safety Guide (ICS); Code of Safe Working Practice for Merchant Seamen; Tank Cleaning Guide (Chemical Laboratory "Dr. A. Verwey") International Maritime Dangerous Goods Code (IMCO)
4. Hazard and Hazard Control 4.1. Explosion and flammability risk 4.2. Health hazard 4.3. Reactivity hazard 4.4. Tank corrosion 4.5. Environmental pollution 4.6. Safety equipment and personal protection 4.7. Measuring instruments	10	Flashpoint and flammable limits data books; autoignition temperature tables; elec-tromotive series; measuring instruments manuals; Safety equipment instructions;	Chemical Tanker Safety Guide (ICS); International Maritime Dangerous Goods Code (IMCO); Chemical data handbooks; Recommendation Concerning Fire Safety Requirements for Cargo Ships (IMCO); Tanker Casualties Report (IMCO)

COURSE CONTENTS	NO. OF LESSONS	AIDS AND MATERIAL	REFERENCES
5. Emergency Operations 5.1. Emergency organisation plan 5.2. Fire-fighting on board chemical tankers 5.3. Collision and grounding situations 5.4. Tank leakages 5.5. First aid measures 5.6. Rescue from enclosed spaces	8	Fire Fighting manuals; Safety equipment instructions;	International Maritime Dangerous Goods Code (IMCO) Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (IMCO); Tanker Casualties Report (IMCO);
6. Repair and Maintenance	2	Manufacturers handbooks and manuals *) Suited conventional educating appliances (transparacies, slides, films, tapes and working papers) should be used in the lessons.	

Considerations, Provisions and Syllabus of an Advanced Specialized Training Course on Chemical Tanker Operation

A. Considerations

The STCW-Convention determines Requirements for the Training and Qualification of Master, Officers and Ratings of Chemical Tankers

General Certification

Shore-based Fire Fighting Course

Chemical Tanker Familiarization Course

Appropriate period of supervised Shipboard Service

Service on Chemical Tankers with Specific Duties in Connection with Cargo and Cargo Equipment

Relevant Experience on Chemical Tankers appropriate to Duties

Specialized Training Programme
(Advanced Chemical Tanker Operation Course)

Service on Chemical Tankers with immediate Responsibility for Cargo Operations

This specialized training programme which is dealt with in the following, is required by Regulation V/2 of the International Convention on Standards of Training, Certification and Watch-keeping for Seafarers, 1978. The applicable part of this regulation reads:

"2. Masters, chief engineer officers, chief mates, second engineer officers and, if other than the foregoing, any person with the immediate responsibility for loading, discharging and care in transit or handling of cargo, in addition to the provisions of paragraph 1, shall have:

a) relevant experience appropriate to their duties on chemical tankers; and

b) completed a specialized training programme appropriate to their duties including chemical tanker safety, fire safety measures and systems, pollution prevention and control, operational practice and obligations under applicable laws and regulations."

B. Provisions

Course level: Specialized Training Programme

1. Essential Equipment

1.1. Overhead projector

Slide projector

appropriate transparencies and slides

charts and diagrams

1.2. Working papers for special tasks

1.3. Gas detector sets

Explosimeter, different types

Oxygen analyser

1.4. First aid equipment

Resuscitation set

Breathing apparatus

Escape devices

Eye washing set

1.5. International Dangerous Goods Code (MCO)

Chemical Tanker Safety Guide (ICS)

Code for Construction and Equipment of Ships Carrying Dangerous Goods in Bulk (IMCO)

Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (IMCO)

Recommendation Concerning Fire Safety Requirements for Cargo Ships (IMCO)

International Convention on Tanker Safety and Pollution Prevention, 1978 (IMCO)

Manual on Oil Pollution (IMCO)

Report of the Symposim on Prevention of Marine Pollution from Ships (Acapulco - 1976) (IMCO)

Chemical data handbooks

Manufacturer's and Shipbuilders handbooks and guides

Fire-fighting manuals

Total estimated cost. 7,500 US dollar

2. Desirable equipment

2.1. Film projector

Video tape recorder

appropriate film and tapes

2.2. Molecule models

Tank material and coating patterns

Pump models

Sealing and gasket patterns

Valve models

2.3. Chemical laboratory

total estimated cost: 15,000 US dollar

3. Teaching Personnel

The personnel should consist of each a

Chemist or Chemical engineer

Master mariner

Marine engineer

Both the latter with chemical tanker experience

4. Number of participants

To obtain an intensive training, the number of participants should not exceed 12.

5. Duration of a course

The duration ofa course should be 10 working days (2 weeks) with six lectures of 60 minutes per day.

COURSE CONTENTS	NO. OF LESSONS	*) AIDS AND MATERIAL	REFERENCES
1. Properties and Reactions of Liquid Chemical Cargo	12	Chemical equipment; Periodic table; Physical and chemical data tables; molecule models; Vapour pressure tables and diagrams	International Maritime Dangerous Goods Code (IMCO) Chemical Tanker Safety Guide (ICS); Chemical dictionaries and handbooks
1.1. General characteristics of liquid chemical cargo			
1.2. Properties of selected liquid chemicals: Oxidizing agents Mineral acide Caustics Amines and amides Organic acids and anhydrides Esters Isocyanates Alcohols and glycols Aldehydes and ketones Phenols Olefines Paraffines Aromatic hydrocarbons Vinyl compounds Halocarbons Nitrocompounds			
2. Cargo Containment	8	Shipbuilder's construction plans Manuals and patterns on tank material and coatings	Codes for the Construction and Equipment of Ships carrying Dangerous Goods in Bulk (IMCO); Chemical Tanker Safety Guide (ICS); National classification rules
2.1. Containment systems			
2.2. Rules for construction, classification and equipment of chemical tankers			
2.3. Tank structure			
2.4. Tank material and coating			
2.5. Double bottoms and cofferdams			

COURSE CONTENTS	NO. OF LESSONS	*) AIDS AND MATERIAL	REFERENCES
2.6. Pumping and piping design			
2.7. Slop tanks			
3. Cargo Handling Systems	8	Manufacturer's handbooks and manuals; pumps cross-section pictures and disgrams; pumps and gasket patterns; pump diagrams; measuring instruments; Ship's tank and cargo lines arrangement plans;	Chemical Tanker Safety Guide (ICS); Code of Safe Working practices for Merchant Seamen;
3.1. Types of cargo pumps			
3.2. Pipes and hoses			
3.3. Sealings and gaskets			
3.4. Tank venting and inerting facilities			
3.5. Gas detecting and monitoring instruments			
3.6. Cargo gauging systems			
3.7. Cargo heating and cooling devices			
3.8. Cargo sampling and control			
4. Operational Procedure	10	Cargo computer or calculator; ship's stowage plans; cargo segregation tables; coatings compatibility charts; Inerting manuals;	International Maritime Dangerous Goods Code (IMCO); Chemical Tanker Safety Guide (ICS); National and port regulations; Tank Cleaning Guide (Chemical Laboratory "Dr. S. Verwey)"
4.1. International and national codes and regulations			
4.2. Port regulations and communication			
4.3. Cargo stowage			
4.4. Cargo calculation			
4.5. Tank and cargo survey			

COURSE CONTENTS	NO. OF LESSONS	*) AIDS AND MATERIAL	REFERENCES
4.6. Tank cleaning and gasfreeing			
4.7. Safety check lists			
5. Cargo hazards	6	Chemical and physical data handbooks; electromotive series; toxicity tables;	Chemical Tanker Safety Guide (ICS); International Maritime Dangerous Goods Code (IMCO); Chemical data handbooks; Recommendation Concerning Fire Safety Requirements for Cargo Ships (IMCO); Tanks Casualties Report (IMCO) TLV tables; Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (IMCO); International Converence on Marine Pollution, 1978 (IMCO); Internationa Convention on Tanker Safety and Pollution Prevention 1978 (IMCO);
5.1. Health hazard Ingestion, inhalation and skin contact of toxic chemicals; toxicity limits; short and long term effects			
5.2. Fire and explosion hazard Flammable limits; flashpoint; autoignition temperature			
5.3. Chemical reaction hazard Cargo interaction; polymerisation catalysis; autoignition; Coating interaction; corrosion; heat of reaction			
5.4. Envrionmental pollution Cargo spillage, drifting vapour clouds; reactions with water and air; ecological impact			
6. Safety equipment and measures	8	Measuring isntruments and manuals; fire-fighting handbooks and guides; safety equipment instructions; first aid guides; resuscita-	Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (IMCO); Recommendation Concerning Fire Safety Requirementsfor Cargo Ship (IMCO); Chemical Tanker Safety Guide (ICS);
6.1. Measuring instruments Detecting and monitoring of vapours, gases and flammable mixtures; oxygen control; application, calibration and maintenance of measuring instruments			
6.2. Protective clothes and equipment for safe cargo handling			

COURSE CONTENTS	NO. OF LESSONS	*) AIDS AND MATERIAL	REFERENCES
6.3. Fire fighting measures and equipment			
6.4. First aid measures Resuscitation; eye washing; skin cleaning; use of rescue sets; breathing apparatus; appliance of antidotes; rescue of enclosed spaces			
7. Emergency Procedure	8	Ships's tank and cargo lines arrangement plan; fire-fighting manuals; chemical data handbooks;	Internationa, national and local alarm plans; Recommendation Concerning Fire Safety Requirements for Cargo Ships (IMCO); Manual on Oil Pollution; Report of the Symposium on Prevention of Marine Pollution from Ships (IMCO);
7.1. Emergency shutdown of cargo operations			
7.2 Emergency measures in case of fire and explosion			
7.3. Emergency measures in case of cargo spillage			
7.4. Emergency measures in case of chemical interaction and polymerisation			
7.5. Emergency measures in case of collisions and strandings			
7.6. Emergency plans Measure and timing schedules; personal assigment; life and health protection; ship/shore communication			

*) Suited conventional educating applicances (transparancies, slides, films, tapes and working papers) should be used in the lessons.