1987

Proposal for the implementation of international training requirements for tanker personnel in Venezuela

Efren S. Frias Carrasquero
World Maritime University

WORLD MARITIME UNIVERSITY
MALMö, SWEDEN

PROPOSAL FOR THE IMPLEMENTATION OF INTERNATIONAL TRAINING REQUIREMENTS FOR TANKER PERSONNEL IN VENEZUELA

by

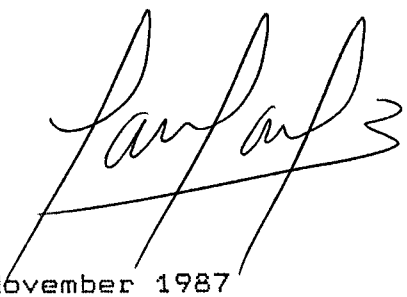
Efren S. Frias Carrasquero

Venezuela

A paper submitted to the Faculty of the World Maritime University in partial satisfaction of the requirements for the award of a

MASTER OF SCIENCE DEGREE
in
MARITIME EDUCATION AND TRAINING (NAUTICAL).

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

Signature: 

Date: 15 November 1987

Supervised and assessed by:
GUNTHER ZADE
Professor
World Maritime University

Co-assessed by
HERMANN KAPS
Department of Nautical Studies
Hochschule Bremen
Bremen, FRG
Visiting Professor World Maritime University.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

The Author acknowledges with most sincere thanks to:

Dr. Adalberto Chacon, Merchant Marine Officer and Secretary of the Fondo de Capacitacion y Mejoramiento Profesional del Marino Mercante Venezolano for his effort in taking steps to obtain my fellowship and part of the fund through the secretariat of this institution so that I could attend the two (2) years course in Maritime Education and Training (Nautical) at the World Maritime University.

Admiral Sheldon Kinney in name of the Friends of the World Maritime University Foundation for providings the other part of the funding for the course.

Professor Gunther Zade for his outstanding encourangement in this work and as course professor.

Professor Hermann Kaps who as co-assesor gave valuable advice during the preparation of this thesis.

All the visiting professors and Lecturers of the World Maritime University for their valuable advice.

Captain Domingo Gargano and Mr. Pedro Armas who assisted me in the compilation of materials for developing this paper.

All my friends and colleages, especially to Mr. Carlisle Jordan who assisted me in the English editing.

ABBREVIATIONS

Adv chm T...Advanced Chemical Tanker Operation Course.

Adv LPG T...Advanced LPG Tanker Operation Course.

Adv oil T...Advance Oil Tanker Operation Course.

ARPA.....Automatic Radar Plotting Aid.

a.t.....Asphalt tanker.

CEPET.....Centro de Formacion y Adiestramiento Petroleo y Petroquimico.

CO_2.....Carbon dioxide.

CRISTAL.....Contract Regarding an Interim Supplement to Tanker Liability for Oil Pollution.

Dwt.....Deadweight.

Fam chm T...Familiarization Chemical Tanker Course.

Fam LPG T...Familiarization LPG Tanker Operation.

Fam oil T...Familiarization Oil Tanker Course.

Hp.....Horse power.

ICS.....International Chamber of Shipping.

IGS.....Inert gas system.

ILO.....International Labour Organization.

IMDG.....International Maritime Dangerous Goods Code.

IMO.....International Maritime Organization.

INCE.....Instituto Nacional de Capacitacion Educativa.

LNG.....Liquefied natural gas.

LOT.....Load on top.

LPG.....Liquefied petroleum gas.

m.....Metres.

MARPOL.....International Convention for the Prevention of Pollution from Ships, 1973.

NH_3.....Ammonia.

OCIMF.....Oil Companies International Marine Forum.

Of.....Officers.

OPEC.....Organization Petroleum Exports Countries.

o.t.....Oil tanker.

PDVSA .....Venezuelan Petroleum (Petoleos de Venezuela).

p.t.....Products tanker.

Ra.....Ratings.

s.o.....Shore operative.

SOLAS.....International Convention for the Safety of Life at Sea.

STCW.....International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978.

T.....Tons.

TOVALOP.....Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution.

ULCC.....Ultra large crude carrier.

VLCC.....Very large crude carrier.

CHAPTER I

INTRODUCTION

VENEZUELA.

LOCATION, SIZE and EXTENT.

Venezuela, that is located on the northern coast of South America, covers an area of 912,050 sq km (352,143 sq mi), extending 1,478 km (924 mi) WNW-ESE and 1,175 km (730 mi) NNE-SSW. It is bordered on the north by the Caribbean Sea and the Atlantic Ocean, on the east by Guyana, on the south by Brazil, and on the west by Colombia, with a total boundary length of 7,609 km (4,728 mi). There are 72 offshore islands.

ECONOMY.

For over 45 years the economy has been completely dominated by the petroleum industry, and by the early 1980s oil exports accounted for 95% of all export value.

In 1982, Venezuela was the world's third-largest oil exporter and seventh-largest producer. Together with Mexico and the North Sea area, Venezuela is among the most important producers of oil for the western world outside of the Middle East, with a net exportable capacity nowadays of about 1.5 million barrels of oil per day (agreed to OPEC's limit). The output of natural gas is 17,000 million m^3.

In 1982, proved oil reserves were estimated at 24.6 billion barrels, and the Orinoco tar belt, was estimated to contain reserves of at least 700 billion barrels of a heavy-grade petroleum.

On 29 August 1975, President C.A. Perez signed into

law the Oil Industry Nationalization Act, under which all concessions to private oil companies were rescinded as of 31 December 1975. A state holding company, Petroleum of Venezuela (Petroleos de Venezuela or Petroven now PDVSA), was established in September 1975 with an initial capital of $465 million. PDVSA obtained a 50-year renewable monopoly over Venezuelan petroleum production, beginning 1st. January 1976.

Within a few years, PDVSA's 14 original operating companies were combined into four:

- Lagoven, the largest subsidiary, formerly the Creole Petroleum Corporation, an Exxon affiliate.
- Maraven, formerly a Royal Dutch/Shell subsidiary.
- Meneven, formerly Mene Grande, a Gulf subsidiary and
- Corpoven, including the former Mobil Oil subsidiary.

After the Oil Industry Nationalization Act, in January 1st, 1976 PDVSA or Petroleos de Venezuela's had renewed its fleet by replacing 12 tanker ships with average age of 18 years old with 19 ships of 7 years average age.

Furthermore Venezuela accepted in August 1986, for parlamentary law the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW).

This paper explains the design and implementation of specialized training courses for officers and ratings in tanker operation according to minimum guidelines laid down by the IMO STCW Convention, with the objetive of promoting safety of life and property at sea and protection of the marine environment.

Another important occurrence which took place a few years ago, about 1980 was the start of trading activities

in chemical products.

In view of the big request of this kind of products to national and international level, and the need to export the products manufactured by the Venezuelan Moron Petrochemist, a Venezuelan private company called Venezolana de Transportes Quimicos C.A., (Ventransquim) or Venezuelan Chemical Transport acquired in 1980 a chemical tanker which was brought from Belgium. The main characteristics of this tanker are listed below.

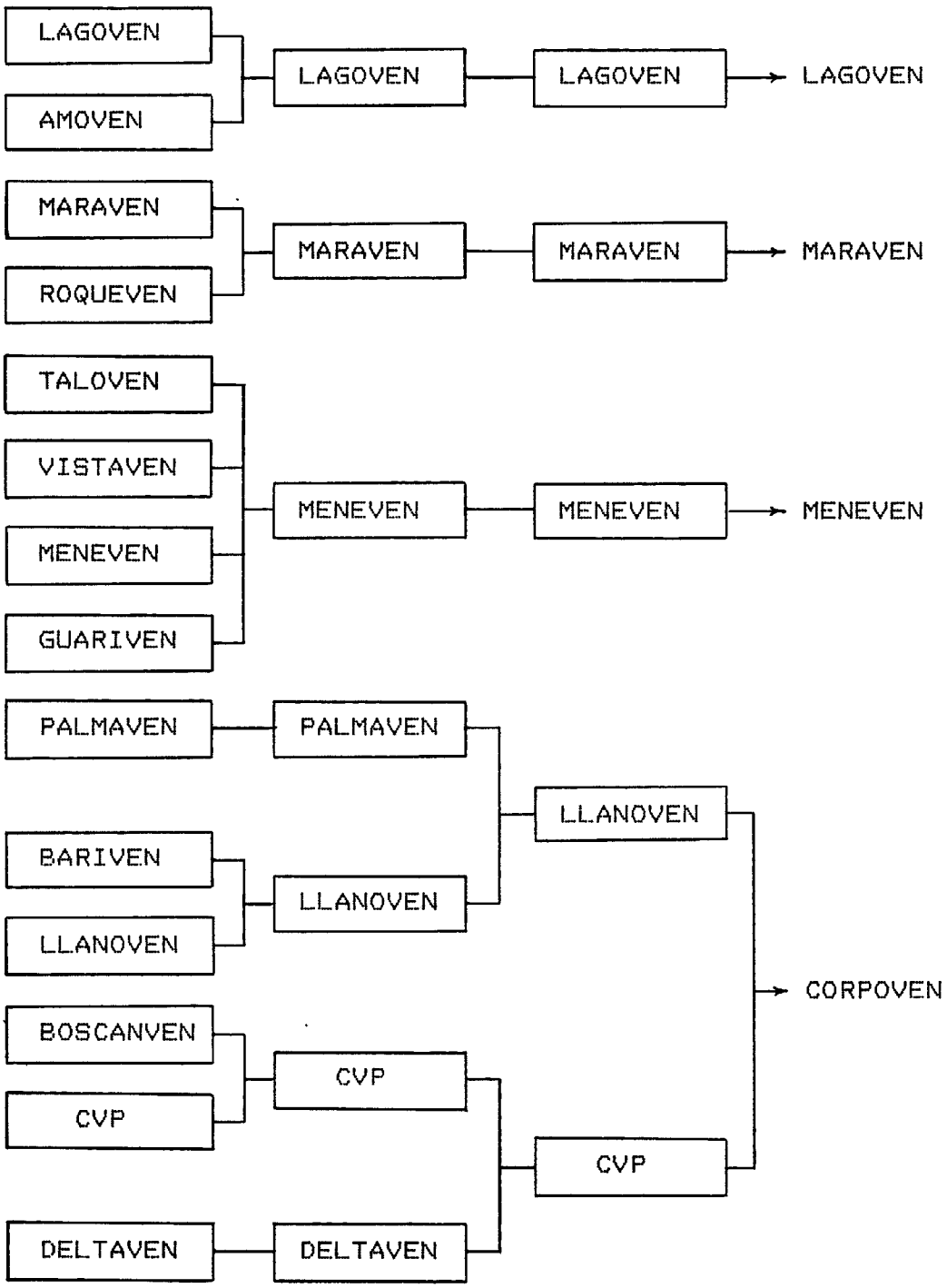
At the time of purchase of this tanker there were no personnel to man this type of ship and so the company had to send some officers and ratings to the U.S.A. for training in the operation, handling and safety procedures of this special type of ship.

Since the start of this company the practice of sending these personnel for training in the U.S.A. has continued.

Main Characteristics of chemical tanker:

Name:	Turpial.
Shipowner:	Ventransquim.
Type:	Chemical tanker.
Trade:	Oceangoing.
Year and country of build:	1970, Belgium.
Classification Society:	Lloyd Register.
GRT:	11,065 T.
Dwt:	18,715 T.
Liquid:	21,920 m^3.
Crew:	33.
Length:	158.58 m.
Breadth:	22.15 m.
Draugth:	9.47 m.
Propulsion:	1 Diesel.
Power:	9,800 Hp.
Speed:	15 knots.

THE NATIONALIZATION OF THE VENEZUELA OIL INDUSTRY.



THE PROCESS OF INDUSTRY CONSOLIDATION.

Source: Taken from 6 (see bibliography).

CHAPTER II

THE VENEZUELAN OIL INDUSTRY NATIONALIZATION AND TANKER FLEET

TRANSITION PERIOD OF OIL NATIONALIZATION INDUSTRY ABOUT THE RENEWED OIL TANKER FLEET.

On the implementation of the Oil Industry Nationalization Act on 1st. January 1976 Venezuela nationalized its oil industry and so became the owner.

At this time Venezuela had a fleet of fourteen (14) ships with average age of 18 years, all operated and manned by Trans-national companies. This fleet which included one ship owned by one Venezuelan shipowner comprised of:

- Six (6) ships operated by Creole Petroleum Corporation.
- Five (5) ships operated by Shell Oil Company.
- Two (2) ships operated by Venezuelan Petroleum Corporation (CORPOVEN).
- One (1) ship operated by the Venezuelan shipowner (Navemar).

Except for the two (2) ships operated by CORPOVEN which were about 2 years old at the time, the others which were steam ships of the 1960's operated practically a coastal service or cabotage between Aruba and Curazao refineries.

The Oil Industry Nationalization Act brought all the oil industry infrastructure and operation that were

located in Venezuela under national ownership, however the trading with client and marketing of products remained with the trans-national since Venezuela itself did not have its own clients. This part of the operation naturally could not have been nationalized.

Venezuela therefore, had to sign trading pacts with some countries in attempt to maintain continuity in the trading and selling of crude and refined products.

In signing these pacts however although Venezuela had a thriving oil industry in terms of products, refinery, etc, obtaining the ships to transport the products to these new clients was a very serious problem since as mentioned earlier they were all operated and manned by trans-national companies.

It should be noted here, that, although the oil industry had many development projects on hand the question of ships and transport was not a very high priority at this moment.

In 1977 the size of the fleet started decreasing and going out of service at a time when there was intensive exploitation of petroleum products and a corresponding very high cabotage traffic. It was observed and seen in many ways that transportation was necessary and so should become a priority, now that these ships were reaching the end of their operating days.

In that year (1977), a guide-line plan was established which outlined the necessity to get new ships to replace those in the fleet. In the interim PDVSA had been operating with a few own ships in order to satisfy the national market for flag reasons. Ships were also chartered in order to maintain the necessary service with clients.

TYPES, QUANTITY, SERVICE, MODERN TECHNOLOGY AND MANNING POLICY OF THE VENEZUELAN SHIP TANKERS.

The first ships were acquired in 1978. There were ships of large tonnage ordered by shipowners who had the expentancy that the oil business and markets would continue to get better and so had these ships for sale. Four (4) of these ships each of 30,000 tons deadweight were purchased. The Caruao and the Pariata were bought by Maraven while the Quiriquire and the Santa Rita were bought by Lagoven and all were carriers of refined products.

In 1979 discussions were started by PDVSA to acquire the tanker ship Borburata which was under construction in the Puerto Cabello shipyard in Venezuela. Also in 1981 oil companies went to the ship market and purchased four (4) more ships in the range of 60,000 tons deadweight. Two (2) were bought by Lagoven and two (2) by Maraven. Similar to the ships purchased in 1978 these were ships built by shipowners who predicted continued expansion of the industry but prefered to sell when the market situation appeared to decline. These ships were asigned to the transport of crude.

In this process of acquisition, by 1982 Venezuela was able to phase out the older ships which it acquired under the Nationalization Act in 1976 and so have a relatively newer and younger fleet.

In 1983 as a result of the implementation of the National Gas Plan, Maraven acquired two (2) Liquefied Petroleum Gas (LPG) tankers, also involved in this plan were the Cardon and El Palito refineries and both the local and international markets were the targets.

The national gas plan in Venezuela was aimed at

expanding the natural gas operation through making it available for local use and for export. Also in this year Lagoven acquired two (2) more crude oil tankers each of 70,000 tons deadweight.

In 1984 the last two (2) ships in the renewal process of the tanker fleet were acquired by Lagoven. These were two (2) 15,000 tons deadweight asphalt carriers.

The new fleet which totalled nineteen (19) tanker ships was distributed as follows:

- 10 ships operated by Lagoven.
- 7 ships operated by Maraven and
- 2 ships operated by Corpoven.

In terms of tonnage the deadweight which was 320,000 tons before the Nationalization Act in 1976 increased to almost 800,000 tons in 1985 and with this increase was the capacity to transport more petroleum products.

This also helped to consolidate the market and increase the cabotage traffic and the same time started the international trading transporting petroleum with our own ships.

There was also the significant occurrence of the transfer from steam to diesel propulsion technology. This was an important factor since the ships on short round trips made between 80 to 90 voyages per year while those on oceangoing trip made between 12 and 16 voyages.

The introduction of the diesel motor resulted in changes in organizational structure of the maintenance routines. For example, while a turbine was opened every 5 years for overhaul and repairs, the diesel motor need continuous maintenance and may call for examination and repair of, say, pistons every two (2) months.

This means with this change in technology where there was the need for more maintenance and closer supervision, that the organizational structure, training and mentality of the officers would also have to change.

With the change of the fleet and the acquisition of special ships there were also some organizational changes in the oil companies especially in their operation and maintenance practices. For example, the acquisition of the two (2) LPG ships by Maraven for the transport of gas meant the introduction of new technology compared to conventional ships and consequentely there had to be adjustments to cope with this.

Simultaneously with the acquisition of particularly these LPG carriers, and even at the construction stages Venezuela and the Republique of Mexico signed a trade agreement which contained the safety and crewing of these ships.

Mexico in the meantime had ratified the STCW Convention 1978, incorporated it into its maritime education and training system and was issuing Certificates of Competency along their guidelines.

Maraven therefore, was keenly interested in the training of its staff and crews to the required level to ensure the safe transportation of this liquified gas. This was not a continuos process since officers were trained as they were needed.

About twenty (20) officers comprising of 10 deck and 10 engineer officers were trained in Mexico where the course was of 3 months duration. In addition to the main safety course for LPG carriers, they also received instruction in Radar and Engine Simulators, and fire prevention and fighting in compliance with the 1978 STCW Convention.

This first group of officers, after the training course, obtained practical experience aboard LPG carriers which were on charter by PDVSA to start the gas transport business while new ships were being constructed in a shipyard in Finland.

In Finland these officers also received training for three (3) months to familiarize themselves with the ships and equipment before delivery.

This resulted in the putting together of a good proffessional working team of individuals who were interested and dedicated to their jobs since it was thought that the gas ship is *" The king of the tanker ships "* for them, and contrary to conventional and some other specialized ships the people working them worked more with their head and brain than with physical strength and routine.

These ships have operated very satisfactory and the crew and management responded to the challenge even beyond the expectations of PDVSA. They have been in different ports of the world and have drawn attention because of their versatility, operational capacity and loading and offloading speed.

The organization changed to adapt to the new demands and the people also changed. Maraven even sent two (2) engine technicians to England for courses lasting one and half years in engine maintenance.

In addition, consideration is being given to introduce courses in Inert Gas and Crude Oil Washing in Venezuela.

With the LPG vessels operating and staff funtioning PDVSA decided to organise these courses for individuals with responsibilities for ship maintenance and operation

and an individual officer with experience has to arrange teaching materials for the teachers. The Ministry of Communication and Transport must be approached to approve these courses and so introduce them into officially recognized training programmes.

Even with all these efforts, it would appear that some officials in other branches of the oil industry did not fully realize the importance of staff training and safety standards on board these ships and may have not given them the serious attention which they deserved. They were very surprised, for example when these ships began making trips to the U.S.A. and the U.S. Coast Guard checked for compliance with both the IMO and U.S.A. regulations regarding safety standards. These ships were fined more than once.

This demonstrated a lack of understanding by Venezuelan officials of what was required at the international level of these matters.

These incidences spurred on ideas for a united effort to confront the challenge of training and education.

Two paths were possible:

a.- Education and training by way of the organized merchant marine training system.

b.- Education and training undertaken by the oil industry.

However, at this time there was some confusion by the merchant marine training system over the STCW convention, 1978, since Venezuela although being a member IMO was not represented at the conference.

In the other approach i.e, by the oil industry this would mean all the individual companies seeking harmony in this venture as was the example in Mexico where the

Mexican Petroleum Institute (PEMEX), shipping companies and the Maritime Academies took care of staff training with the industry providing financial assistance while the academies performed the training.

PDVSA took some action in this direction and created the " CENTRO DE FORMACION Y ADIESTRAMIENTO PETROLERO Y PETROQUIMICO " (CEPET) or Oil and Petrochemist Training and Formation Centre.

CEPET undertook the training but the certification was the responsibility of the Ministry of Communication and Transport at the Navigation Direction Department.

Most important however was for Venezuela to ratify the International Convention so that it could have the right to demand that other ships calling at its ports also conform to the IMO international regulation with respect to aspects of safety, certification and documentation.

Finally on July 30th, 1986 Venezuela ratified the STCW convention and now arrangements are being made to get it into legislation and implement it.

The IMO STCW Convention has been hailed as a significant achievement:

" It is the first international instrument designed to improve safety at sea by setting minimum standards of competence in the operation of ships ".

COMPLIANCE WITH SOLAS AND MARPOL CONVENTIONS.

During the period in which the oil industry was under the control of the trans-nationals greater importance was placed on the charter revenue of the ships (cost/hour), not on the cost of oil and there was more concern by these companies to transport large quantities of oil from Venezuela.

The goal of trans-national personnel who operated the ships at that time was to ensure that the ships completed as many voyages as possible in the least possible time. To acomplish these, ships had to arrive at port ready for loading.

They therefore, deballasted and sometimes did tank cleaning and washing without due regard and consideration for the areas and the environment. These practices resulted in pollution of the maritime environment.

More serious consideration were given to safety on board and the prevention of accidents than to pollution. The records show that a ship was able to made 13 round trips in one month between the port of La Salina in Maracaibo and the Aruba refinery and putting in 100,000 man/hour without any accidents on board.

During the three (3) years period between 1973 and 1976 Venezuela experienced the following significant occurences:

- Ratification of SOLAS and MARPOL Conventions.
- An increase in oil prices.
- The Oil Industry Nationalization Act.

These factors resulted in the price of the oil having greater priority than the revenue from chartering of ships as was previously the case.

Also the requirements of the conventions help to create consciousness regarding pollution of the environment and other safety standards and guidelines. To these factors were now added the safety on board and prevention of accident practices on which the personnel concentrated previously.

PDVSA

LAGOVEN	MARAVEN	CORPOVEN
10 Ships	7 Ships	2 Ships
CARIPE (ot)	BORBURATA (ot)	INDEPENDENCIA I
60,433 tons Dwt	29,500 tons Dwt	29,926 tons Dwt
QUIRIQUIRI (pt)	CARUAO (pt)	(pt)
32,000 tons Dwt	32,000 tons Dwt	
SANTA RITA (pt)	MURACHI (ot)	INDEPENDENCIA II
32,000 tons Dwt	61,000 tons Dwt	29,926 tons Dwt
SINAMAICA (ot)	PARIATA (pt)	(pt)
60,433 tons Dwt	32,000 tons Dwt	
AMBROSIO (ot)	URIMARE (ot)	59,852 tons Dwt
70,100 tons Dwt	61,000 tons Dwt	7.9%
GUANOCO (at)	PARAMACAY (LPG)	
15,223 tons Dwt	8,500 tons Dwt	
INCIARTE (at)	YAVIRE (LPG)	
15,223 tons Dwt	8,500 tons Dwt	
MORICHAL (ot)		
70,100 tons Dwt	232,500 tons Dwt	
MORUY (ot)	30.7 %	
55,165 tons Dwt		
PARIA (ot)		
55,165 tons Dwt		
465,842 ton Dwt		
61.4 %		

Ships and deadweight distribution for branches.

CHAPTER III

MARITIME EDUCATION AND TRAINING IN VENEZUELA

Within the Maritime Education and Training system in Venezuela there are different establishments at which seafarers are educated and trained for various levels in the profession.

Among these institutions and their approaches to maritime education and training are:

1.- The Nautical School of Venezuela.

The majority of merchant marine officers receive their education and training at the Nautical School of Venezuela.

The full study programme consists of four (4) years duration of which three (3) years are devoted to shore based studies and one (1) year to practice at sea on board nationally owned merchant ships.

The nautical cadet during his stay at that school receives the necessary education directly related to the general and specific subject areas in agreement with his speciality.

In addition to these subjects mentioned above the cadet from 1984 according to the IMO regulation and guidelines must receive training and be successful in fire fighting in the second semester, survival at sea in the fifth semester and first aid in the sixth semester.

During the last year of shore based studies, training and practice are given in Radio-telephony carried out at the search and rescue center located in the Nautical school and Automatic Radar Plotting Aid (ARPA). This ARPA

course which has a duration of one (1) week is only available at Maraven for officers who operate in the oil industry.

The institute does not teach the following courses which are necessary to fulfil the minimum requirement for IMO supplementary certificates for personnel willing to work in ships transporting oil, chemicals or gas. These courses are: Pollution Safety and Prevention, Crude Oil Handling, Crude Oil Washing, Inert Gas and Liquid Petroleum Gas.

The cadet on completion of studies receive a third class certificate for either Deck or Engine according to his speciality which qualifies him to act as a watchkeeping officer on conventional merchant ships.

2.- Post-Graduate School. (Escuela de Estudios Superiores de la Marina Mercante).

The Ministry of Transport and Communications after defining the plans for national fleet development decided to seize the opportunity of channelling the available and appropiate human resources into professional specialization, updating and perfecting them as merchant marine officers in the institute.

a.- First Officer course (Deck and engine speciality).

The second officer certificate of competency can be received after sailing 12 months net as a third officer. However to become a first officer the candidate must attend this school after 24 months net sailing with the second officer certificate.

The shore based training lasts for 8 months and the candidate has an opportunity to study professional and

general subjects, getting this to update his knowledge.

b.- Master Courses, Deck and Engine Speciality.

After a first officer sails for 36 months net he undergoes study at the post-graduate school for 14 to 16 weeks in order to obtain a Master or Chief Engineer Certificate of competency. The candidate in addition to his special subjects is lectured in Management, Maritime Law and Shipping business.

c.- Other Courses.

At the post-graduate school the following special courses are offered:

- Naval Surveyor - for both Masters and Chief Engineers.
- Maritime Law - for Masters, Chief Engineers and Lawyers.
- Maritime Transport (Freightment) - to all officers.
- English - to all officers.

3.- Self Study.

Under the self study method, a person does not have to attend the nautical school nor the post-graduate school but can study on his own and write the third officer examination and proceed further up once he possesses the other qualification such as sea time.

The Ministry of Communication and Transport appoints twice per year during February and August an examination commiitee which prepares and supervises examinations for apprentices and officers writing for certificates. These examinations are conducted over a period of two (2) weeks.

Both apprentice and officer must have sailed for 36 months net minimum to qualify for taking the examination.

4.- Training to operate small ships.

The training for Coxswain and Motorman to operate small coastal ships is done by special school dedicated for this purpose and located in different parts of the country.

These coxswain and motorman are in charge of the deck and engine of vessels under 200 gross registered tonnage and include: tugs, pilot boats, launches, etc.

5.-Officers Upgrading.

With the continuing introduction of new technology and the sophistication of ships, plus the establishment of new international regulations to navigation, safety and maritime transport it became necessary and indispensable to organize the process of training crew and update both officers and ratings so that they can get the best possible training and reach the highest level to perform efficiently in new ships with modern technology. Provision for these additional training have to be made outside of the Venezuela Nautical School and the Post-graduate School.

In view of the above, the oil industry in Venezuela through PDVSA found it necessary to do studies and so create the CEPET since neither merchant marine officer nor ratings receive formal training in tanker ship operation.

Both before and during the employment of officers and ratings with shipping companies little or no specialized training is received according to the recommendation of IMO. The only training and information received is from other experienced crew or by actually performing the jobs on board.

Since the creation of CEPET one of its first functions

was the study of training needs of crew working on board tanker ships for the short, medium and long terms and determine the priority in which training should be done in development with the human resources of the oil industry trained personnel.

Along this line have been developed two (2) courses on teaching methodology which had been given to twelve (12) participants who will be future teachers in the programme.

With the acquisition of the ARPA simulator by Maraven (one of the oil company branch) seven (7) courses in anticollision using radar were given to 59 participants.

Also English courses emphasizing shipboard operation with a duration of 380 hours per course have been developed.

At the present time the CEPET with the branches experts are planning and designing programmes to cover the following training:

- Oil handling.
- Liquid petroleum gas.
- Handling of chemicals.
- Crude oil washing and
- Inert gas.

In addition the CEPET is also planning courses in:

- Survival at sea techniques.
- Salvage.
- Seamanship.
- Ship maintenence and conservation.
- Paint removal and application and
- Training on engine operation for ratings.

Training in shipboard service i.e, catering, stewardship, and cooking are also being planned.

It is also foreseen that training would be required for staff and personnel involved in the National Contingency Plan on Oil Spill.

6.- Training of Ratings.

Specified training for ratings does not exist in any of the nautical institutions in Venezuela.

Personnel who become ratings generally have six (6) years of education at primary school, starting at seven (7) years of age. Many have completed high school.

Completion of high school takes eleven (11) years after starting should at seven (7) the age of.

Ratings normally acquire their training and experience through informal information passed on by others in the field and by actually learning on the job.

7.- Supplementary Certificates.

The Ministry of Communication and Transport through its recent " *Resolution 144* " of 1985 created the following supplementary certificates for merchant marine personnel:

- Liquid petroleum gas.
- Crude oil washing.
- Fire fighting.
- Pollution safety and prevention.
- Radio telegraphy.
- Survival at sea.
- Automatic radar plotting aids (ARPA) and
- First aid.

These certificates for a duration of 5 years and renewable after that period would be granted to people who have satisfactorily completed training in the above areas.

CHAPTER IV

TRAINING NEEDS OF THE OIL INDUSTRY OF VENEZUELA

The IMO to which the majority of government and consequently their fleets and national flags adhere, requires in its conventions that the crew of signatory countries attain certain standards of training and certification of competency especially in the ports of other convention signatory countries.

Venezuela national oil fleet sails to many European ports and other countries which require IMO standard certificates.

Furthermore, those tankers of short, medium and long voyages which possess diesel propulsion systems are also equipped with modern navigation equipment and other instruments in accordance with IMO specifications and regulations.

Some of those include cargo system, warehousing and product unload procedures, inert gas system, crude oil washing equipment, to take care of the product while navigation and safety equipment would include radiotelephony equipment for communications, radar and anticollision radar plotting aids, fire control and prevention system, safety equipment and entertainment for the crew.

In view of the above and the high cost and large operational risk it became necessary to demand efficient crew, administration and management and this can only be achieved through training.

If the personnel are given good education and

training it would be possible to obtain:

- Increase in crew efficiency.
- Decrease in risks and accidents and unsafe conditions in ships and installations.
- Safe navigation and manoeuvre.
- Adequate operation and maintenance.
- Safe handling and transportation of products.
- Good communication.
- Environment protection.

EMPLOYMENT OF SEAFARERS IN THE OIL INDUSTRY OF VENEZUELA.

Among the three (3) major oil companies for which information is available it is estimated that approximately 1,299 seafarers and operators are employed in the following categories:

Table 1: Employment of Seafarers in the Oil Industry in Venezuela.

	LAGOVEN		MARAVEN		CORPOVEN		VENTQUM	
	Of	Ra	Of	Ra	Of	Ra	OF	RA
Tanker crew	160	293	110	206	34	65	15	40
Tugs crew	35	107	30	77				
On shore operative	99		66		17			

Source: CEPET publication on Human Resources 1985 for Maraven, Lagoven and Corpoven.

Estimation for Ventransquim based on number of ships.

In addition to the above estimate, throughout the year there would be need for rotation personnel to replace those who go on leave, retire, change job and it is estimated (by the author) that approximately 20 Officers, 80 ratings and 10 shore operatives need replacing every year.

In consideration of this table 1, in order to have the normal capacity in accordance with Regulations V/1, V/2 and V/3 of the STCW Convention 1978, it will be necessary that an estimate (by the author) of 25% of the officers and 50% of the ratings should undergo the oil tanker familiarization course while 40% of the officers should undergo the advanced oil tanker (refresher) course.

Among the LPG tankers, 10% of the officers and 15% of the ratings will need to take the liquified gas tanker familiarization course while 20% of the officers will need the advanced LPG tanker (refresher) course.

Furthermore, 40% of the officers and 60% of the ratings employed with Ventransquim will require the chemical tanker familiarization course, while 40% of the officers require the advanced chemical tanker (refresher) course.

In order to accomplish the updating of the officers and ratings currently employed in the oil industry the training programme should be intensive and take place during the first four years of start of training activities. After this period personnel to be employed would undergo normal training programmes which will be built into the education and training system.

ESTIMATE OF TRAINING REQUIREMENTS.

From the date available it is estimated the following training is required in the immediate future.

Table 2: Estimate of officers, ratings and shore operators to be updated in four years.

	LAGOVEN			MARAVEN			CORPOVEN			VENTRANSQUIM		
	Of	Ra	s.o	Of	Ra	s.o	Of	Ra	s.o	Of	Ra	s.o
Fam oil T.	49	200		33	142		8	33				
Adv oil T.	78		40	56		26	14		7			
Fam LPG T.				14	43							
Adv LPG T.				28		13						
Fam Chm T.										6	24	
Adv Chm T.										6		

Source: Estimations from table 1

THE NEED FOR THE TRAINING OF RATINGS.

At the present time there is no institution private or public, in Venezuela which caters to the training of ratings in preparing them for shipboard work.

In view of the fact that the ratings receive no special profession or technical training they are employed on an ad-hoc basic and so have to have training on the job. This results in them being given very little responsible and they hold the lowest position in the deck, engine or catering department.

As a consequence of the above situation there are individuals working on board ship with little or no knowledge of ship board work and this ignorance can

create dangers to safety, risk of pollution, loss of time and so on. On the other hand these risks can be reduced if there is some sort of training before they are employed.

This general situation, therefore, suggests that there is need for specialized training for ratings who wish to work on board tankers or in any ship and this training should be done before they are employed.

THE TRAINING OF RATINGS.

In the STCW convention 1978 we find the following definition of the term rating:
"Rating means a member of the ship's crew other than the master or an officer".

We have ratings in the various departments on board except the radio department, i.e. in the deck department, the engine room department and the catering department.

Internationally we find only few papers or documents dealing with ratings, in this connection it is possible to mention ILO Certification of Able Seamen Convention 1946 and successive conventions.

The International Convention on Standards of Training, Certification and Watchkeeping for Seaferers 1978, contains regulations and resolutions such as "Regulation II/6 and III/6 regarding Mandatory Minimum Requirements for Ratings forming part of a navigational watch and an engine room watch respectively, also Resolution 8 and 9 about additional training for ratings.

Regulation V/1 Mandatory Minimum Requirements for the Issue of Certificates of Proficiency on Survival Craft and Resolution 19 training seafarers in personal survival techniques.

The training of ratings always has been a neglected field by goverments or education authorities and the development of our ratings is based on this experience:
" The young man starting on board as a deck boy and then going up through the grades from deck boy to junior ordinary seaman and ordinary seaman and finally to able bodied seaman or even boatswain doing his best to pick up as much experience and knowledge as possible on the way up the grades on his own initiative ".

The same procedure is with the ratings working in the engine room.

Many good sailors have been produced in this way but the technical evolution has made this system out of date and insufficient.

It is noted that in principle there is no difference between the training of ratings and the basic training of persons seeking higher education to obtain an officer certificate of competency.> 1)

PROJECT TO THE TRAINING OF RATINGS.

(This project for the training of Ratings is a proposal by the author).

DECK RATINGS.

On board we should have 4 categories of seamen:

a) Ordinary seaman, that means seaman under training.
b) Able seaman, that means fully trained and qualified seamen.
c) Helmsman and
d) Boatswain.

---

1) Taken from source 3 The Training of Ratings (see bibliography).

The training of deck ratings should be divided in three (3) parts:

a.- Six (6) months course at a pre-sea school.

b.- Twelve (12) months practice on board a merchant vessel.

c.- Three (3) months final vocational course for deck crew.

I.- The Pre-Sea School.

It is ideal to go to a pre-sea school before going to sea for deck service. The reason for this is that it is of major importance that the young man, before he enters a ship, knows something about the safety equipment and how to protect himself against dangers and accidents and that he knows how to behave on board ship, for example in the case of Netherland and Denmark.

In the school or a training ship he will get much better and better planned guidance in this respect than if he is just put on board ship as a deck boy as is normal.

This Pre-Sea School should be organized by the state or any private entity with government help.

The object of the pre-sea school is to give young persons, who intend to go to sea, a general and elementary practical and theoretical pre-training to the sea.

I will propose that the apprentice (a young man just starting to go to sea) to start his studies must be from 16 to 25 years of age, as well as to have passed the elementary school (9 years).

During the course the apprentices should be instructed in boat service and practical ship's work (seamanship) and ship's maintenance, further other subjects like Spanish, English, swimming, etc; should be included.

Partly important in the training of the apprentices will be the use of the safety equipment in ships, that is lifeboats, including motor lifeboats, liferafts, especially inflatable liferafts, buoyant apparatus, portable radio apparatus, lifebuoys and life jackets.

Another important subject will be fire detection and extinction, the use of water hydrants and hoses as well as the use of fire extinguishers of different types and foam fire extinguishing.

This training is intended to impress on the mind of the apprentice the need to prevent and protect himself against accidents and casualties.

PRACTICE ON BOARD MERCHANT VESSEL.

During the twelve (12) months practice period on board the young man should serve in the capacity of ordinary seaman, and he should be supplied with a training book. This book should contain a list of a different tasks or activities an Able seaman to be is supposed to have exercised.

The book should be signed by the boatswain with the authorization of the chief officer for each theme to certify that the seaman is acquainted with the job in question.

THE FINAL VOCATIONAL COURSE FOR DECK CREW.

Final vocational course for deck crew should have the same premise as the pre-sea school.

The subjects at the final course should be more or less the same as during the pre-sea course but more advanced, and at the end of the course the seaman could

receive a certificate of competency.

During this part of the course, a week special fire fighting course at a fire fighting special place (could be the fireman station) could be planned . In this part of the course he must be trained in practical fire fighting very thoroughly.

Having passed through the training and education just mentioned the seaman should be qualified to sign on as Able Seaman and continue to serve on board in this capacity. Thereafter in consideration of each individual capacity, the companies will be responsible for the promotion in the job, i.e. helmsman or boatswain.

THE TRAINING OF ENGINE ROOM RATINGS.

The training of engine room ratings should in principle follow the same system as for deck ratings, starting with a basic training course at a pre-sea school of exactly the same contents as the course for deck ratings.

On board there should be 3 categories of engine room ratings:

a) Trainee Motorman.
b) Efficient Motorman, and
c) Mechanic.

The training of engine room ratings should be divided in 3 parts:

a.- Six (6) months course at Pre-Sea School.
b.- Six (6) months practice on board a merchant vessel.
c.- Three (3) months Final Vocational Course for engine room crew.

In relationship with the training book, practice on board, promoting in the job, fire fighting course, etc; these should follow the same procedure as the training for deck ratings.

THE TRAINING FOR CATERING STAFF RATINGS.

To obtain a certificate of competency as ship's Cook a candidate should have completed a basic training at an approved Pre-Sea School and thereafter an apprenticeship in the cooking profession for not less than eighteen (18) months of which not less than twelve (12) months in seagoing ships, these first six (6) months should be studied in the Instituto Nacional de Capacitacion Educativa (INCE) or Educative Learning National Institute.

The catering staff ratings should comprise:

a) Cook's mate.
b) Ship's cook.
c) Messman, and
d) Steward.

The training of ship's cooks should be divided into 3 parts:

a.- Six (6) months course at pre-sea school.
b.- Eighteen (18) months practice of which six (6) should be in the INCE and twelve (12) in sea-going ships or eighteen months in sea-going ships.
c.- Six (6) months final course at the INCE.

The course at the pre-sea school should have subjects related to the safety on board, i.e; life saving appliances practical training in emergency procedures, safety at sea, etc; in the same procedure as the curriculum for the pre-sea school for deck and engine room ratings.

The curriculum will contain further subjects as: cookery, food resources, provisions, stores, etc; and practical work in the galley.

When leaving the Pre-Sea School the person concerned should be supplied with a training book for cook and stewards to be used in the same way as the training book for deck and engine room ratings. Further the apprentice will have the chance of studying general subjects by means of the correspondance course during the 12 or 18 months of practical service on board ships.

Personnel who will not require a pre-sea school i.e, messroom and cabin boy, first time steward, restaurant personnel in ferries, etc; should have safety courses.

Such courses should cover a basic sea-survival course (life saving appliances, especially inflatable life rafts), and basic fire and accident prevention courses.

PRE-SEA SCHOOL

Two (2) terms a year - six (6) months each

BASIC TRAINING COURSE

CURRICULUM

SUBJECTS	Lessons	
Spanish and English	Approx.	80
Mathematics	"	50
Physics basic knowledge	"	50
Seamanship (theory)	"	50
Navigation and rules of the road	"	50
Technical drawing	"	50
Seamanship (practical)	"	100
Labourer's right	"	30
Seamens laws	"	30
Life saving appliances, emergency procedures, safety at sea	"	120
Fire fighting and drills	"	25
Machinery and tools	"	100
Maintenance (practical)	"	100
Hygiene	"	25
Swimming and sport	"	80
Lessons (hour) per course	Approx.	940

Three (3) days course at a fireman station training practical fire fighting.

FINAL VOCATIONAL COURSE FOR DECK CREW

Four (4) terms a year - 10 weeks each

CURRICULUM

SUBJECTS	Lessons	
Spanish	Approx.	45
English	"	45
Mathematics and physics	"	50
Seamanship (practical)	"	60
Navigation and rules of the road	"	30
Safety at sea, fire fighting	"	70
Machinery	"	20
Maintenance and tools	"	60
Hygiene	"	20
Lessons (hour) per course	Approx.	400

Five (5) days course at a fireman station training practical fire fighting.

FINAL VOCATIONAL COURSE FOR ENGINE ROOM CREW

Four (4) terms a year - ten (10) weeks each

CURRICULUM

SUBJECTS	Lessons	
Spanish	Approx.	20
English	"	20
Mathematics	"	20
Physics	"	20
Seamanship (practical)	"	20
Fire fighting and drills	"	20
Machinery (theory)	"	60
Machinery (practical) and tools	"	100
Welding	"	60
Electricity	"	40
Hygiene	"	20
Lessons (hour) per course	Approx.	400

Five (5) days a fireman station training practical fire fighting.

FINAL COURSE FOR SHIP'S COOKS

Two (2) terms a year - six (6) months each

CURRICULUM

SUBJECTS	Lessons	
Spanish	Approx.	100
English	"	100
Cookery	"	400
Bread making, bakery	"	30
Mathematics	"	70
Galley work	"	70
Provision and stores	"	50
Food resources and hygiene	"	70
Lessons (hours) per course	Approx.	890

Five (5) days course at a fireman station training practical fire fighting.

In each course the lesson-hour should be of 45 minutes.

CHAPTER V

SPECIALIZED COURSES ON OIL, CHEMICAL AND LIQUEFIED GAS TANKER: FAMILIARIZATION AND ADVANCED TRAINING

FAMILIARIZATION OIL TANKER COURSE.

<What is an Oil Tanker?

The first oil tanker was launched less than a hundred years ago. In this relatively short time, tankers have evolved into efficient, oil - moving machines - the largest mobile objects ever constructed.

Every tanker, whether a small coastwise vessel or mammoth supership, is basically a hollow steel shell subdivided into tanks by longitudinal and transverse bulkheads. The engine room is located aft, as is the bridge on newer ships.

A system of pipe lines fitted along the bottom of the tank range carries oil to and from the tanks. Pumps are used for discharging; these are installed in one or more pumprooms which in turn are connected to a main-deck manifold by additional piping.

Oil is transferred from ship to shore and vice versa by means of flexible hoses and steel loading arms which bolt onto the ship's manifold.

Tankers come in all sizes and designs. They carry a

variety of products, consisting mainly of crude oil and its derivatives: gasoline, diesel fuel, stove oil, bunker fuel, kerosene, jet fuel, and many others.

In addition, a few specialized vessels carry exotic cargoes such as: wine, vegetable oil and molasses.

The type of cargo a tanker carries largely determines the complexity of her operation and, consequently, the amount of sweat and concentration required from her officers.> 1)

<Through the formulation of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 (STCW 1978), the Member Governments of IMO have emphasized the vital importance of training in the attainment of safety at sea and the avoidance of pollution.

Many accidents and failures at sea can be directly attributed to the lack of proper training of ship's staff. Thus as specialized ships are developed to perform specialist trading functions, and shipboard operational systems become more sophisticated, the need for properly organized and controlled training programmes becomes more urgent than ever.

This is especially true of ships engaged in carrying hazardous cargoes in bulk, such as petroleum products, where an accident involving such a ship can cause heavy loss of life or do terrible damage to the environment.

The carriage of material in liquid form gives a number of advantages:

- Loading, transfer and discharge is done simple by means of pumping systems.
- Cargo space is most efficiently used.

However, there are disadvantages:

- The material is either flammable or toxic or both thus

---

1) Taken from source 4 (see bibliography).

creating hazards to life, through explosions or leakage.

- The danger of pollution of the environment on a large scale is always présent.
- Problems may be encountered in cleaning the cargo spaces.
- Special materials may have to be used in cargo tank construction.

Taking all these factors into consideration, these vessels are the only means by which the vast amounts of materials involved can be transported economically in bulk.

Safety considerations have always been to the fore in design, construction and cargo handling and containment system of ships which carry hazardous liquids in bulk. However, no design or system can be 100% proof against all potential hazards.

There is thus a continuing research and development effort to maintain and improve the safe transportation of these hazardous liquid in bulk.

In the field of training, an impact is being made by the 1978 STCW Convention. This convention is one of many conventions adopted by Members Government of IMO in furthering the aim of *"Safer Ships and Cleaner Oceans"*. Training is seen to be an important factor in the global effort to achieve greater safety at sea and the 1978 STCW convention contains a number of provisions concerning the carriage of hazardous liquids.

Training programmes reflecting the standards of the 1978 STCW convention will ensure a common minimum global standard, and if adopted by maritime nations in this case Venezuela, will do much to improve safety and prevent pollution.> 1)

---

1) Taken from source 1 first part (see bibliography).

In this chapter six (6) training courses for officers and ratings of tankers having in consideration the annex of Resolution 10; 11 and 12 of STCW convention about " *Recommendation on Training and Qualifications of Officers and Ratings of Oil, Chemical and Liquefied Gas Tankers* ", will be proposed.

1.-<Training of Officers and Ratings Having Specific Duties and Responsibilities in Connection with Cargo and Cargo Equipment in oil tankers.

Training should be divided into Two (2) parts, a general part concerning principles involved, and a part on the applications of those principles to ship operation. Any of this training may be given at sea or shore. Such training should be supplemented by practical instruction at sea and, where appropiate, in a suitable shore-based installation. All training and instruction should be given by properly qualified personnel.

This resolution requires training to be given to officers and ratings responsible for cargo handling and equipment in the following subjects:

A.- Principles.
- Characteristics of oil cargoes.
- Toxicity.
- Hazards.
- Hazard control.
- Safety equipment and protection of personnel.

B.- Shipboard application.
- Regulation and codes of practice.
- Ship design and equipment of oil tanker.
- Ship operations.
- Repair and maintenance.
- Emergency operation.

2.- Training for other personnel.

Such personnel should undergo training on board ship and, where appropiate, ashore, which should be given by qualified personnel experienced in the handling and characteristics of oil cargoes and safety procedures:

- Regulations.
- Health hazards and precautions to be taken.
- Fire prevention and fire fighting.
- Pollution prevention.
- Safety equipment and its use.
- Emergency procedures.
- Cargo equipment and operations.

3.- Fire-fighting Training.

All personnel should attend an approved basic or advanced practical fire-fighting training course relevant to their duties and responsabilities.> 1)

Training can play a major part in making the individual tanker safer. Circumstances dictate that more and more training must be done ashore.

This is now invaluable, and ranges from fire-fighting courses to marine seminars, as well as courses on simulators for ship handling, cargo system operation, as well as engine room operation.

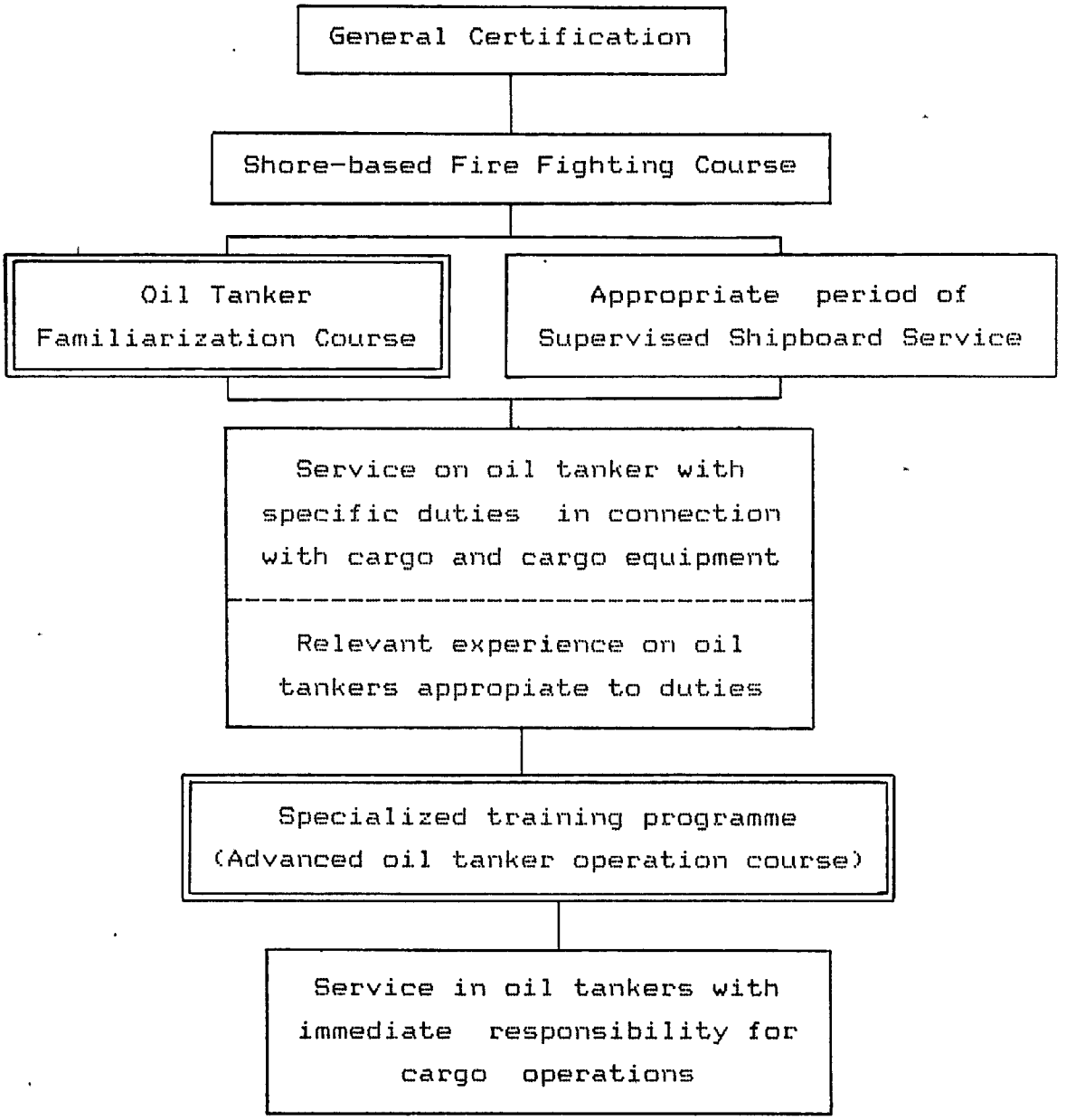
All of these training aids have much in common, though they deal with vastly different problem areas:

- They break down the emergency or problem into its components to provide a clear understanding of the cause and the best opportunities for solutions.
- They endeavour to provide a systematic approach where the individual is a member of a team which is co-ordinated and operates to a pre-established plan.

---

1) Taken from source 7 resolution 10 (see bibliography)

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



Training scheme for oil tanker staff.

Taken from source 1 first part (see bibliography).

SPECIALIZED COURSE OIL TANKER FAMILIARIZATION

IMO MODEL COURSE. THEIR PURPOSE AND USE.

Purpose of the Model Courses.

The purpose of the IMO model course is to assist maritime training institutions and their teaching staff in organizing and presenting their existing training material and to supplement or update the training material already available where the quality and effectiveness of the training courses provided may thereby be improved.

It is not the intention of the model course programme to present lecturers, teachers or tutors with a rigid *" teaching package "* which they are expected to *" blindly follow ".* Nor is it the intention to substitute audio visual or *" programme "* material for the teacher's presence. As in all training endeavours the knowledge, skills and dedication of the teacher is the key component in the transfer of knowledge and skills to those being trained utilizing IMO model course material.

The model course material has been designed so as to identify the basic entry requirements and target student group for each course in universally applicable term and to clearly specify the technical content and levels of knowledge and skill necessary to meet the technical intent of the convention and related recommendations.

Use of Model Course.

To use the model course the instructor should review the course plan and detailed syllabus taking into account

the information provided under the entry standards specified in the course framework.

The actual level of knowledge and skills and prior technical education of the actual course participants should be kept in mind during this review and any areas within the detailed syllabus which may cause difficulties because of differences between the actual student entry level and that assumed by the course designer should be identified.

To compensate for such differences, the instructor is expected to delete from the course or reduce the emphasis on those items which deal with knowledge or skills already attained by the actual course entrants.

The instructor should also identify any academy knowledge, skills or technical training which the actual course entrants may not have achieved.

Through an analysis of the detailed syllabus and the academic knowledge required to allow training in the technical area to proceed, the instructor can design an appropriate academic knowledge required to support the technical training elements concerned at requisite points within the technical course.

Within the course plan the course designers have indicated their assessment of the amount of time which should be allotted to each learning area.

However, it must be appreciated that these allocation are arbitrary and assume that the students have fully met all entry requirements of the course.

The instructor will therefore have to review these assessments and reallocate the time required to achieve each specific learning objective.

Lesson Plans.

The instructor having adjusted the course content to suit the student intake and any revision of the course objectives, should then proceed to set up lesson plans based on the detailed syllabus. The detailed syllabus provides specific references to the text books or teaching material proposed to be used in the course, (see an example of a lesson plan in the appendix, page 86.

Where no adjustment has been found necessary in the learning objetives of the detailed syllabus, the lesson plans may simply consist of the detailed syllabus with keywords or other reminders added so as to assist the instructor in making his presentation of the material.

Presentation.

Presentation of concepts and methodologies must be repeated in various ways until the instructor is satisfied that each specific learning objective has been attained by the trainee. The syllabus is laid out in learning objective format and each objective specifies *what the student must be able to do* as learning outcome.

Evaluation or Assessment of student progress.

Within the detailed syllabus sample questions are identified to assist the instructor in evaluating whether or not the trainee has indeed attained the learning objectives.

The questions are provided, one in the subjective or precise type question format and the other in the objective multiple choice format.

Implementation.

For the course to run smoothly and be effective, considerable attention must be given to the availability and use of:

- course presenters.
- support staff.
- rooms and other spaces.
- equipment.
- text books.
- technical paper, and
- other reference material.

Thorough preparation is the key to successful implementation of the course. IMO has produced a booklet entitled *" Guidance on the Implementation of IMO model courses "* which deals with the aspect in greater detail.

COURSE FRAMEWORK.

1.- Scope:

This course is intended for those officers and key ratings who have not previously served on board an oil tanker as part of the regular complement and covers the mandatory minimum training requirements prescribed by regulations V/1 paragraph 1-b of the STCW Convention, 1978 and includes basic safety and pollution prevention precautions and procedures, layouts of different types of oil tankers, types of cargo, their hazards and their handling equipment, general operational sequence and oil tanker terminology. The course as designed takes full account of the annex to Resolution 10 adopted by the International Conference on Training and Certification of

seafarers, 1978.

2.- Objective:

Those successfully completing this course should be able thereby to serve on oil tankers in a capacity other than master, chief engineer officer, chief mate or second engineer, and may perform specific duties and responsibilities related to those duties in connection with cargo and cargo equipment provided that they are not immediately responsible for the loading, discharging or care in transit or handling of cargo.

3.- Entry Standards.

This course is open to experienced seafarers who have not necessarily served on board an oil tanker as part of the regular complement but who have completed an appropiate shore-based fire fighting course approved by the Administration.

4.- Course Certificate, Diploma or Document.

Provided that the course has been approved by the Administration, a participant who successfully completes it may be issued with a certificate or diploma attesting that he has completed the course specified in STCW regulation V/1 paragraph 1-b and, if he is the holder or is to be issued with a certificate under the provisions of that convention, such a certificate may be endorsed by the issuing Administration.

5.- Student number, limitations.

The number of students should be in agreement to the necessities and never exceed 20 and the practical training should be undertaken in small groups of not more than four (4) participants.

6.- Staff requirements.

All training and instruction should be given by properly qualified personnel and the senior instructor must have experience as master or chief mate of an oil tanker. All assistant instructors should have a knowledge of seafaring and during practical training one assistant instructor must be in charge of each group. Staff may be recruited from deck officers of oil tankers, fleet superintendent, freight department, cargo survey bureaux or laboratories as appropriate.

7.- Teaching facilities and equipment.

Ordinary classroom facilities and an overhead projector are sufficient, but if possible a visit to an oil tanker should be arranged.

8.- Training aids.

One of each of the following item of equipment is required for classroom demonstration:

- Resuscitator.
- Breathing apparatus.
- Portable fire extinguisher (foam).
- Portable fire extinguisher (CO_2 type).
- Portable fire extinguisher (water type).
- Portable fire extinguisher (dry powder type).
- Portable oxygen meter.
- Personal oxygen monitor.
- Combustible gas indicator.
- Chemical absorption tubes.

9.- Teaching aids.

- Instructor manual.
- Safety courses on explosion and gas measurement on crude oil carriers.

- Overhead projector transparencies.

10.- Duration of a course.

The duration of a course will be one (1) week of five (5) working days with six (6) lessons of 60 minutes per day.

11.- IMO References.

- 1978 STCW regulation V/1 1-b Mandatory Minimum Requirements for the Training and Qualifications of Masters, Officers and Ratings of Oil Tankers.
- 1978 STCW Conference Resolution 10 Training and qualifications of officers and ratings of oil tankers.
- 1978 TSPP Conference Resolution 8 Improvement of the standards of Crew on Tankers.
- Standard Marine Navigational Vocabulary.
- Regulation for the Prevention of Pollution by Oil.
- Inert gas system.
- Crude oil washing system.
- Medical First Aid Guide Use in Accidents, Involving Dangerous Goods (MFAG).

12.- Text book references.

- Safety in oil tankers.
- Basic safety training for personnel on board oil tankers and combination carriers.

13.- Bibliography.

- International safety guide for oil tankers and terminals.
- Gas measurements on combination carriers and crude oil tankers.
- Tanker handbook for deck officers.

INSTRUCTOR MANUAL.

The instructor manual provides guidance on the material that is to be presented during the course.

This manual should contain the course materials and texts used as references.

The course outline provides guidance on the time allocation for the course material, but the presenter of the course is free to modify this if it is felt necessary. The detailed teaching syllabus must be carefully studied, and where appropriate, lesson plans and/or lecture notes compiled.

It will be necessary to prepare material for use with overhead projectors, and/or for distribution to the participants as handout.

Some sketches and diagrams are provided in appendix, pages 87-88 which will provide examples of the kind of material useful in supporting the presentation of the course.

Preparation is essential if the course is to be effective and successful.

Throughout the course it is important to stress that aboard ship rules and regulations must be strictly observed and all precautions taken to maximize safety with minimum effect on the environment.

COURSE OUTLINE

Subject Area	Hours	
	Lecture	Lab.
1.- The tanker		
1.1 Introduction	0.5	
1.2 Tanker types	1.0	
1.3 Tanker terminology	0.5	
Sub-total	2.0	
2.- Petroleum properties and hazards		
2.1 The hydrocarbon structure	0.5	
2.2 Physical properties of petroleum	1.0	1.5
2.3 Hazards from petroleum	0.5	0.5
Sub-total	2.0	2.0
3.- Oil cargo containment and handling		
3.1 Tank arrangement	1.0	
3.2 Piping arrangement	1.0	
3.3 Pump types	2.0	
3.4 Pump Characteristics	0.5	
3.5 Draining and stripping	0.5	
3.6 Measurement of cargo level	0.5	
3.7 Cargo heating	0.5	
Sub-total	6.0	
4.- Oil tanker operations		
4.1 Loading	0.5	
4.2 Loaded voyage	0.5	
4.3 Discharging	0.5	
4.4 Ballast voyage	1.0	
4.5 Tank cleaning	1.0	
4.6 Crude oil washing	0.5	
4.7 Use of inert gas	0.5	
4.8 Purging and gas freeing	1.0	
4.9 Tank cleaning and gas freeing for repairs	0.5	
Sub-total	6.0	

Subject Area		Hours	
		Lecture	Lab.
5.- Marine pollution			
5.1 Causes of marine pollution		1.0	
5.2 Prevention of marine polluition		1.5	
	Sub-total	2.5	
6.- Safety			
6.1 Precaution for protection of personnel and ship		1.0	
6.2 Fire fighting		1.5	
6.3 Safety equipment and its use		1.0	1.0
6.4 Emergency measures		1.0	1.0
	Sub-total	4.5	2.0
7.- Discussion / Assessment	Sub-total	3.0	
	total	30.0	

Remark: See the Detailed Teaching Syllabus in appendix on pages 89 to 108.

Pages 42 to 51 Taken from source 2 (see bibliography).

ADVANCED OIL TANKER OPERATION COURSE.

COURSE FRAMEWORK

1.- Scope.

This course is intended for those 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 Regulation V/1 of the STCW convention 1978; and covers the mandatory minimum training requirements prescribed by regulation V/1 paragraph 2-b of the STCW convention 1978, and includes oil tanker safety, fire safety measures and systems, pollution prevention and control, operational practice and obligations under applicable laws and regulations.

A remarkable point in this requirement is that the personnel mentioned are to complete this training programme before assuming immediate responsibility on an oil tanker. Consequently, master, chief engineers and chief officers should not be among the participants of such course.

This point is stressed because masters, chief engineers and chief officers may in some cases need a course as well. This, however, should be a *"refresher course"* rather than the *" specialized training programme "* of the STCW convention 1978.

Further it has to be mentioned that the International Conference on Training and Certification of Seafarers as well as resolution 10 thereof do not provide for the contents of the *"Advanced Oil Tanker Operation Course"*, but resolution 10 does explain the *" Familiarization Course "* in detail.

Bearing in mind the specific tasks of the persons with immediate responsibility some general objectives can be derived from the intentions of regulation V/1. These objectives may be conduced into certain capabilities the trainees should possess after completing the course:

- Comprehension of fire and explosion hazards and the appropiate prevention measures.
- Understanding of principle, function and maintenance of technical installation and equipment.
- Knowledge and application of law and conventions related to pollution prevention.
- Ability to plan and prepare the implementation of operational procedures with due regard to safety standards.
- Ability to organize and supervise personnel activities for regular and emergency procedures including the necessary training of the crew.

2.- Objective.

Those successfully completing this course should be able thereby to serve on oil tankers in a capacity other than officers and ratings, and may have the immediate responsibility for loading, discharging and care in transit or handling of cargo.

3.- Entry standards.

This course is open to experienced seafarers who have necessarily served on board oil tankers as part of the regular complement, furthermore they must have completed an advanced shore-based fire fighting course approved by the Administration.

4.- Course certificate, diploma or document.

Provide that the course has been approved by the Administration, a participant who successfully completes it may be issued with a certificate or diploma attesting that he has completed the course specified in STCW convention regulation V/1 2-b and, if he is the holder or is to be issued with a certificate under the provisions of that convention, such certificate may be endorsed by the issuing Administration.

5.- Student number limitations.

The number of students should not exceed 12 and the practical training should be undertaken in small groups of not more than four (4) participants.

6.- Staff requirements.

As recorded in section 6 of this same chapter on familiarization oil tanker course page 47.

7.- Teaching facilities.

Ordinary classroom facilities, an overhead projector and film projector are sufficient.

8.- Training aids.

Customary gas measuring instruments as follow:

- Portable oxygen meter.
- Portable oxygen-independant hydrocarbon meter.
- Explosive gas detector.
- Hazardous gas detector fit for hazardous gases found in oil tankers.

9.- Teaching aids.

- Instructor manual.
- Various slides or transparencies and overhead projector with appropiate illustrations and diagrams for nearly all lessons.
- Working papers for doing tasks (as mentioned in detailed teaching syllabus sections 1.2; 2.1; 2.2; 2.12; 2.13; 3.6; 4.1; 4.2; 4.3; 4.4; 4.9; 5.1; 5.6) copying facilities, see in appendix on pages 109 to 114.
- Several capacity plans and cargo lines plans of typical oil tankers.
- Manufacturer's manuals and drawings of equipment and instrumentation (used for detailed teaching syllabus sections 2.2 to 2.5; 2.7 to 2.13; 2.17; 2.18), see in appendix on pages 110 and 111.
- Suitable films on various aspects of tanker operation.
- Hardware demonstration material (also damaged pieces of equipment).

10.- Duration of a course.

The duration of a course should be 2 weeks of 10 working days, with 6 lessons of 60 minutes per day.

11.- IMO references.

- 1978 STCW regulation V/1 2-b Mandatory Minimum Requirements for the Training and Qualifications of Master, Officers and Ratings of Oil Tankers.
- ICS/OCIMF International Safety Guide for Oil Tankers and Terminals.
- OCIMF Guidelines + recommendations for the safe mooring of large ships at piers and sea inlands.
- ICS/OCIMF ship to ship transfer guides petroleum-liquefied. Resolution 15 of TSPP conference.
- IMO manual on oil pollution.

12.- Text book references.
- Safety in oil tankers.
- Text of TOVALOP, CRISTAL.

13.- Bibliography.
- International safety guide for oil tankers and terminals.
- Gas measurements on combination carriers and crude oil tankers.
- Tanker handbook for deck officers.

<COURSE OUTLINE

1.- Comprehension of fire and explosion hazards and the appropriate prevention measures.
2.- Understanding of the principle, function and maintenance of technical installation and equipment.
3.- Knowledge and application of law and conventions related to pollution prevention.
4.- Ability to plan and prepare the implementation of operational procedures with due regard to safety standards.
5.- Ability to organize and supervise personnel activities for regular and emergency procedures including the necessary training of the crew.> 1)

Remark: see in appendix on page 109 to 114 the Detailed Teaching Syllabus.

---

1) Taken from source 1 first part (see bibliography).

SPECIALIZED COURSES ON CHEMICAL TANKERS. FAMILIARIZATION AND ADVANCED TRAINING.

ORIGINS.

<The chemical industry has enjoyed tremendous growth rates over the past thirty years. It is a procreative industry in that it uses its energy, improving technologies and profits to devise new processes and molecular motifs to serve industry better.

Progressiveness and flexibility are essential features in a business where virtually every product has at least one alternative. It is a continuing challenge to the chemical industry to find uses for these *"extras"* and to integrate this usage into the overall consumer pattern.

In accepting this challenge the chemical industry has become a major contributor to all the basic aspects of life as we know them today, including food, shelter, transportation, health and communication. The list of products available to us is virtually endless, ranging from pharmaceutical detergents, insecticides, and fertilizer to synthetic fibres, fabrics and rubbers as well as the materials used to package these commodities.

The increasing demand for these products throughout the world had led to the development of sophisticated sea-going vessels to safety carry a wide range of *"special"* cargoes in bulk. All of these cargoes belong to one of the following family groups of chemicals:

Acids-organic	Acids-inorganic
Alcohols	Aldehydes
Alkalys	Ammines

Esters	Ethers
Glycols	Glycols-ethers
Halogenated commounds	Halogens
Hydrocarbons	ketones
Nitriles	Phenoles.

However in general terms, shipment in chemical tankers usually take the form of solvent, aromatics, intermediates or refined products. Chemical tankers do carry a variety of products which would normally be considered to be unrelated to chemical, i.e; wine, molasses, animal and vegetable oils.

However, these cargoes belong to one of the above listed chemical family groups and require as much care and attention as many *"chemical"* cargoes.

Chemical family groups list:

- Petrochemical products.
- Coal tar products.
- Molasses and alcohols.
- Vegetable oils and animal fats.
- Heavy chemical (inorganic substances).

The flexibility inherent in the chemical industry is also a prerequisite for the chemical tanker. The modern parcel tanker is equipped with a variety of stainless steel and coated tanks, pumps and piping arrangements which allow the vessel to carry all of the above cargoes simultaneosly without threat of cross-contamination or damage to the vessel.> 1)

The hazardous nature or special requirements of many of these cargoes reveal the need for a special type of ship to transport them, thus as a special training for the people that operate.

---

1) Taken from source 9 (see bibliography).

CREW TRAINING IN CHEMICAL TANKER.

The recent increase in size, complexity and number of specialized ships carrying potentially hazardous cargoes in bulk has necessitated special training for the crew who man such ships. In the early days of chemical tanker operation accurate information about cargo characteristics and safety precautions were hard to come by. Ship masters may have been supplied with chemical data sheets and a medical antidote kit for each hazardous product but crew awareness was of a poor standard.

In the last decade, however, a great deal of information and experience has been gained by both shore-based operational personnel and sea going staff.

Today, the majority of operators employ ex-masters as superintendents to instruct crew members and bring them up to date on the latest developments in commodity knowledge, safety precautions and rules and regulations.

IMO adopted Resolution A.286 (VIII)" *Recommendation on Training and Qualifications of Officers and Crew of ships carrying hazardous or noxious chemical in bulk* ", in November 1973 and incorporated it into Resolution for seafarers 1978.

<This resolution requires training to be given to officers and ratings responsible for cargo handling and equipment in the following subjects:

A) Principles.

1.- Elementary Physics.

2.- Elementary Chemistry.

3.- Toxicity.

4.- Hazards.

5.- Hazards control.

6.- Safety equipment and protection of personnel.

B) Shipboard Application.

1.- Regulation and codes of practice.

2.- Ship design and equipment of chemical tankers.

3.- Ship operation.

4.- Repair and maintenance.

5.- Emergency operations.

A training programme for other ship personnel is recommended and it is a requirement that all personnel should have attended an approved fire fighting course.

An equally important aspect of training involves experienced officers continuosly educating crew members to bring them up to date on the following:

1.- Health hazards and precautions to be taken.

2.- Safety equipment and its use.

3.- Familiarization with emergency procedures.

4.- Ship design and cargo handling equipment.

5.- Fire fighting (in conjunction with a shore-based fire fighting course).

6.- Regulations.

7.- Pollution prevention.

Safety data, including the emergency procedures to be followed when cleaning up cargo spills, must be provided to the operating personnel. Only by knowing the cargo and its potential hazards can the ship's personnel safely carry out the demands of normal cargo operations as well as react properly to the emergency situation.

Emergency procedures for handling uncontrolled spillage of chemical cargoes in one area where practical training cannot be stressed too strongly. The use of specialized equipment and fire-fighting media may be necessary and their limitations and application techniques must be made familiar to the ship's personnel. Emergency procedures used for many years on petroleum

tankers may be adequate for flammable chemical but for other hazards they may be ineffective. Washing cargo spills with water, for example, would not be the best solution if the cargo reacts with water. New procedures which take into account the characteristics of chemical cargoes have now been developed and these should become as familiar to chemical tanker personnel as the smoking restrictions to oil tanker crew.

A number of training manuals and instructional booklets have been written to aid the trainee operating personnel. The basic information originates with the chemical manufacturers. It is common practice for chemical companies to provide chemical data sheets for the commodities they produce; these outline the basic hazards and properties of the product. Shipboard operating procedures are formulated and can vary from simple verbal instructions to complete operating manuals depending upon the commodity and the volume and frequency with which it is being transported. In most cases the procedures deal specially with three areas:

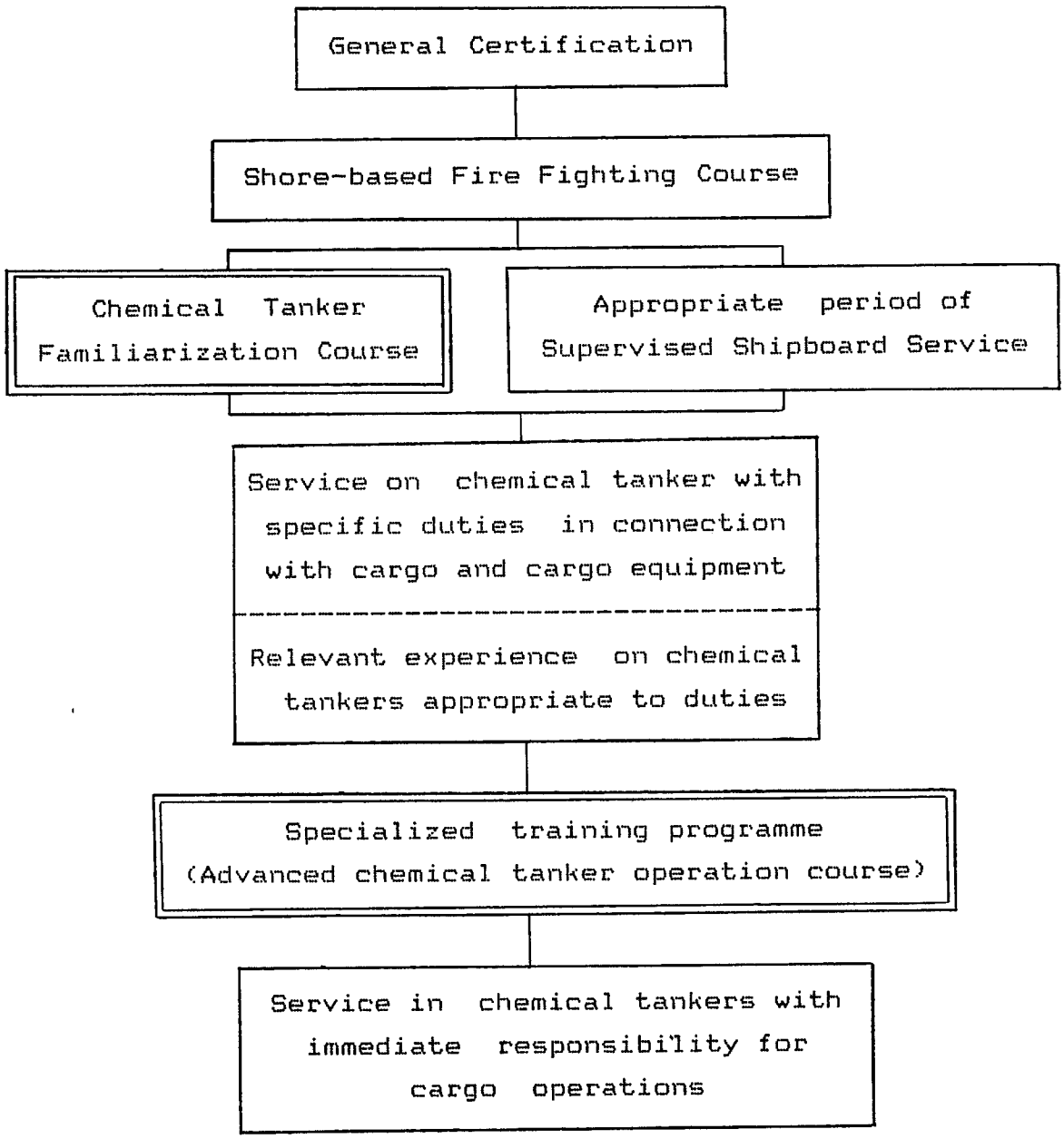
- Preparation of the cargo system for loading the chemical.
- Checking and maintenance of the products and system integrity and
- The safety aspects.

Two useful instructional book are *"Chemical Trade"* prepared by the Norwegian shipping Federation and *"Safety in Chemical Tanker"* compiled by the International Chambers of Shipping in London. These booklets explain, in very simple terms, the use and maintenance of safety equipment and contain information about hazardous and toxic cargoes.> 1)

---

1) Taken from source 1 second part (see bibliography).

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



Training scheme for chemical tanker staff.

Taken from source 1 second part (see bibliography).

SPECIALIZED COURSE CHEMICAL TANKER FAMILIARIZATION.

COURSE FRAMEWORK.

1.- Scope

This course is intended for those officers and key ratings who have not previously served on board a chemical tanker as part of the regular complement and cover the mandatory minimum training requirements prescribed by regulation V/2 paragraph 1-b of the STCW Convention 1978, and includes basic safety and pollution preventions and 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. The course as designed takes full account of the annex to resolution 11 adopted by the International Conference on Training and Certification of Seafarers, 1978.

2.- Objective.

Those successfully completing this course should be able thereby to serve on chemical tankers in a capacity other than master, chief engineer officer, chief mate or second engineer, and may perform specific duties and responsibilities related to those duties in connection with cargo and cargo equipment provided that they are not immediately responsible for the loading, discharging or care in transit or handling of cargo.

3.- Entry Standards.

This course is open to experienced seafarers who have not necessarily served on board an oil tanker as part of the regular complement but who have completed an appropriate shore-based fire fighting course approved by the

Administration.

4.- Course Certificate, Diploma or Document.

Provided that the course has been approved by the Administration, a participant who successfully completes it may be issued with a certificate or diploma attesting that he has completed the course specified in STCW regulation V/2 1-b and, if he is the holder or is to be issued with a certificate under the provisions of that convention, such a certificate may be endorsed by the issuing Administration.

5.- Student number, limitations.

The number of students should not exceed 12 and the practical training should be undertaken in small groups of not more than four (4) participants.

6.- Staff Requirements.

All training and instruction should be given by properly qualified personnel who should consist of a chemical engineer and the senior instructor must have experience as master or chief mate of a chemical tanker. All assistant instructors should have a knowledge of seafaring and during practical training one assistant instructor must be in charge of each group.

7.- Teaching facilities and equipment.

Ordinary classroom, an overhead projector, a slide projector and appropriate transparencies and slides.

8.- Training aids.

One of each of the following item of equipment is required for classroom demonstration:

- Gas detector sets.

- Explosimeter.
- Oxygen analyser.
- Protection suit (fire, chemical).
- Escape and resuscitation equipment.
- Fire fighting equipment.
- Plain chemical experimental devices.

9.- Teaching aids.

- Instructor manual.
- Overhead projector tranparencies.
- Slides projector.
- Film projector.
- Video tape recorder.
- Appropiate film and tapes.

10.- Duration of a course.

The duration of a course should be 2 weeks of 10 working days with a 6 lessons of 60 minutes per day.

11.- Text book references.

- Safety in chemical tanker.
- Shipbuilders and manufacturers guides and handbooks.
- Chemical handbook and dictionaries.
- Fire fighting manuals.

12.- IMO References.

- 1978 STCW regulation V/2 1-b Mandatory Minimum Requirements for the training and Qualifications of Masters, Officers and Ratings of Chemical Tankers.
- IMO IMDG International Dangerous Goods Code.
- ICS Chemical tanker safety guide.
- IMO Code for construction and equipment of ships carrying Dangerous Goods in bulk.
- IMO Medical First Aid Guide for use in accidents.

<COURSE OUTLINE.

1.- Ship design and equipment.
2.- Cargo properties and reactions.
3.- Operational procedures.
4.- Hazard and hazard control.
5.- Emergency procedures.
6.- Repair and maintenance.> 1)

Remark: See in appendix on page 115 and 116 the Detailed Teaching Syllabus.

---

1) Taken from source 1 second part (see bibliography).

ADVANCED CHEMICAL TANKER OPERATION COURSE.

COURSE FRAMEWORK

1.-Scope

This course is intended for those masters, chief engineer officers, chief mates, second engineer officer 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 provision of paragraph 1, resolution V/2 of the STCW convention 1978, and covers the mandatory minimum training requirements prescribed by Regulation V/2 paragraph 2-b of the STCW Convention, and includes chemical tanker safety, fire safety measures and systems, pollution prevention and control, operational practice and obligations under applicable laws and regulations.

2.- Objective.

Those successfully completing this course should be able thereby to serve on chemical tanker in a capacity other than officers and ratings, and may have the immediate responsibility for loading, discharging and care in transit or handling of cargo.

3.-Entry standards.

This course is open to experienced seafarers who have necessarily served on board a chemical tankers as part of the regular complement, furthermore must have completed an advanced shore-based fire fighting course approved by the Administration.

4.- Course certificate, diploma or document.

Provided that the course has been approved by the Administration, a participant who successfully completes it may be issued with a certificate or diploma attesting that he has completed the course specified in STCW Convention regulation V/2 2-b and, if he is the holder or is to be issued with a certificate under the provisions of that convention, such certificate may be endorsed by the issuing Administration.

5.- Student number, limitation.

As recorded in section 5 of this same chapter familiarization chemical tanker course, page 64.

6.- Staff required.

As recorded in section 6 of this same chapter familiarization chemical tanker course page 64.

7.- Teaching facilities.

As recorded in section 7 of this same chapter familiarization chemical tanker course page 64.

8.- Training aids.

One of each of the following items of equipment is required for classroom demonstration:

- Gas detector sets.
- Explosimeter, different types.
- Oxygen analyser.
- First aid equipment.
- Resuscitation set.
- Breathing apparatus.
- Escape devices.
- Eye washing set.

9.- Teaching aids.

- Instructor manual.
- Slides and transparencies projector.
- Films.

10.- Duration of a course.

As recorded in section 10 of this same chapter familiarization chemical tanker page 65.

11.- IMO References.

- 1978 STCW convention Regulation V/2 2-b Mandatory Minimum Requirements for the Training and Qualifications of Masters, Officers and Ratings of Chemical Tankers.
- International Dangerous Goods Code (IMDG code).
- Chemical tanker safety guide (ICS).
- Code for instruction and equipment of ships carrying dangerous goods in bulk (IMO).
- Medical first aid guide for use in accidents involving dangerous goods (IMO).
- Recommendation concerning fire safety requirements for cargo ship (IMO).
- International Convention on tanker safety and pollution prevention, 1978 (IMO).
- Manual in oil pollution.

12.- Text book references.

- Manufacturer's and shipbuilders handbooks and guides.
- Fire fighting manuals.
- Chemical data handbooks.
- Safety in chemical tanker.

<COURSE OUTLINE

1.- Properties and reactions of liquid chemical cargo.
2.- Cargo containment.
3.- Cargo handling system.
4.- Operational procedures.
5.- Cargo hazards.
6.- Safety equipment and measures..
7.- Emergency procedures.> 1)

Remark: See in appendix on page 117 to 120 the Detailed Teaching Syllabus.

---

1) Taken from source 1 second part (see bibliography).

SPECIALIZED COURSES ON LIQUEFIED GAS TANKER (LPG): FAMILIARIZATION AND ADVANCED TRAINING.

GENERAL ASPECTS OF LPG SHIPS.

This heading cover some of the most costly and complicated ships that have ever been, or ever will be built.

Liquefied Petroleum Gas (LPG) and Liquefied Natural Gas (LNG) which are generic term for gases produced as a by-product of the refining process, mainly LPG, or from natural gas fields, LNG.

In this case I will refer to LPG carriers because Venezuela has only this type of ships.

HISTORY:

Transport by sea of liquefied gases began in the early part of the 1930's when a ship especially designed to carry butane was built in the United States. This ship and other early gas carriers were basically simple cargo ships with vertical pressure vessels placed in the holds to carry the cargo, which was discharged simply by introducing water into the bottom of the tank and driving liquid gas from the top. Design of vertical tanks was unchanged for about twenty years, although only a few ships were built. A matter of interest is that one ship of this design is reported to have had as many as 68 tanks, which indicates that, although there was a demand to carry such cargo in ever-increasing quantities, the necessary technology had not kept pace with the need to construct special ship types.

In the early part of the 1950's the first gas carriers were built in European yard and, whilst these

ships were still of the same design as their American predecessors, the individual tanks had become much larger and were generally stowed horizontally, either above or below decks.

As the bounds of technology were extended and materials more suited to the excessively low temperatures were developed, together with the improvement in welding techniques, ships were designed which became the gas carriers that we know today. In view of the very low boiling point (the term *"boiling point"* b.p. is given to the temperature at which a gas converted into a liquid) temperatures of the cargoes, refrigeration and reliquefication plants had to be developed. Due to advanced technology gas carriers today fall mainly into one of the three classes:

1.- Fully pressurised.
2.- Semi-refrigerated.
3.- Full refrigerated.

Our ships fall in the semi-refrigerated class.

PERSONNEL TRAINING.

According to IMO code for existing ships carrying liquefied gases in bulk, chapter XVIII-operating requirements, part 18.3 that say:

- Personnel involved in cargo operation should be adequately trained in handling procedures.
- All personnel should be adequatelly trained in the use of protective equipment provided on board and have basic training in the procedures, appropriate to their duties, necessary under emergency conditions.
- Officers should be trained in emergency procedures to deal with conditions of leakage, spillage or fire

involving the cargo and a sufficient number of them should be instructed and trained in essential first aid for the cargo carried.

In view of afore mentioned I would like to prepare a gas carrier syllabus that should contain the following main subjects:

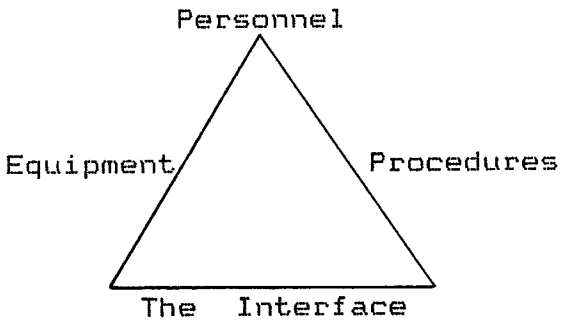
1.-<Applied science (i.e. chemistry and physics of liquefied gases.
2.- Development of gas carriers.
3.- Gas carrier design and construction.
4.- Cargo handling systems.
5.- Operating procedures.
6.- Regulations.
7.- Safety practices and equipment.
8.- Health.
9.- Emergency procedures.
10. Terminal operations.

The inclusion of industrial specialists will make a valuable contribution to courses with the input of their experiences. Some subjects of this course shall be dealt with by these specialists. Syllabus topics 4; 5 and 10 above particularly will benefit from this approach.

The study of emergency incidents form could be an important part of this course.

THE SHIP/JETTY INTERFACE.

Statical analysis of incidents which have resulted in financial loss indicates that the risk is greatest when the ship is alongside the jetty and cargo is being transferred. For this reason considerable emphasis must be placed on cargo handling operations at the ship/jetty interface.



The three essential components which are related to this interface are equipment, operational procedures and personnel. Each of this components, although inter-related one with the other, can often cause difficulties through misunderstanding between ship and jetty.

TERMINAL OPERATION.

Important subjects shall give to know the work of terminal operation, thus the relationship between ship and terminal could be best.

This subjects will be:

- Safety practices at the terminal.
- Pre-arrival information.
- Approaching/entering the port.
- Mooring.
- Cargo transfer system.
- Checklist.
- Cargo operation and
- Areas of responsibility.

THEORY AND PRACTICE.

Perhaps some officers attending these course have previous operational experience on gas carriers and consequently have little difficulty in relating the theory that will be presented in the classroom to operational practice. All topics dealt within the syllabus must have operational relationship to the gas carrier.

On occasions when personnel have had no previous gas experience, then the course will be completed with ship and jetty visits, but on occasions when students would arrive at the jetty to find no cargo transfer operation being conducted for one reason or another, a better approach will be the use of specially prepared and suitable short video tape programmes to illustrate specific points during the lectures.

Laboratory demonstration and use of model in the classroom shall also provide valuable teaching aids.

SIMULATION.

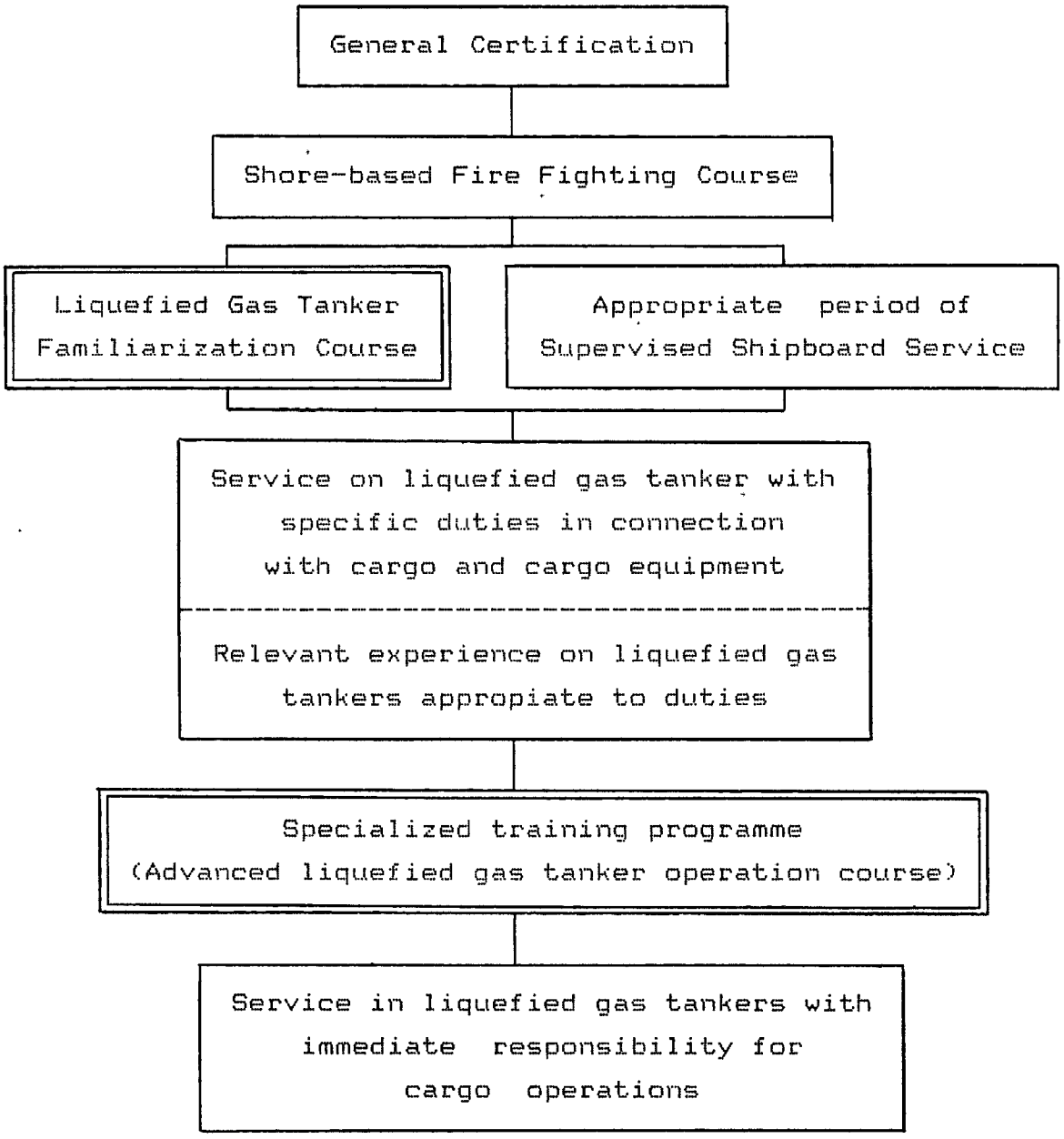
Computerized or non-computerized simulation could make a worthwhile contribution to the understanding of principles which apply to cargo transfer operations, provided that such simulation was designed with sufficient flexibility to deal adequately with the various types of gas carrier and the ship/jetty interface.

One principal advantage of this approach is that it would allow students to gain experience in a safe manner with both normal and abnormal conditions of cargo handling. The effects of equipment malfunction and operational error on the system could with this facilitiy be safety demonstrated.> 1)

---

1) Taken from source 3 gas carrier ship/jetty interface training (see bibliography).

The STCW-Convention determines requirements for the Training andraining Qualification of Masters, Officers and Ratings of Liquefied Gas Tankers.



Training scheme for liquefied gas tanker staff.

Taken from source 1 third part (see bibliography).

SPECIALIZED COURSE LPG TANKER FAMILIARIZATION.

COURSE FRAMEWORK.

1.- Scope.

This course is intended for those officers and key ratings who have not previously served on board a liquefied gas tanker as part of the regular complement and covers the mandatory minimum training requirements prescribed by regulation V/3 paragraph 1-b of the STCW Convention 1978, and includes basic safety and pollution precautions and procedures, layouts of different types of liquefied gas tankers, types of cargo, their hazards and their handling equipment, general operational sequence and liquefied gas tanker terminology. The course as designed takes full account of the annex to resolution 12 adopted by the International Conference on Training and Certification of Seafarers, 1978.

2.- Objective.

Those successfully completing this course should be able to serve on oil tanker in a capacity other than master, chief engineer officer, chief mate or second engineer, and may perform specific duties in connection with cargo and cargo equipment provided that they are not immediately responsible for the loading, discharging or care in transit or handling cargo.

3.- Entry standards.

This course is open to experienced seafarers who have not necessarily served on board a liquefied gas tanker as part of the regular complement but who have completed an appropriate shore-based fire fighting course approved by the Administration.

4.- Course Certificate, diploma or document.

Provided that the course has been approved by the Administration, a participant who successfully completes it may be issued with a certificate or diploma attesting that he has completed the course specified in STCW regulation V/3 paragraph 1-b and, if he is the holder or is to be issued with a certificate under the provision of that convention, such a certificate may be endorsed by the issuing Administration.

5.- Student number, limitations.

The number of students should not exceed 12 and the practical training should be undertaken in small groups of not more than four (4) participants.

6.- Staff requirement.

All training and instruction should be given by properly qualified personnel, who should consist of a chemist/physicist and the senior instructor must have experience as master, marine engineer or chief mate of a liquefied gas tanker. All assistant instructor should have knowledge of seafaring and during practical training one assistant instructor must be in charge of each group.

7.- Teaching facilities.

Ordinary classroom, an overhead projector, a slide projector and appropriate transpariences and slides.

8.- Training aids.

One of each of the following items of the equipment is required for classroom demonstration:

- Resuscitation dummy.
- Specific gas detectors.
- Oxygen analyzers.

- Explosimeters.
- Breathing apparatus.
- Compressor.
- Escape breathing sets.
- Filter masks with appropiate filters.
- Fire protection suit consisting of sectional drawing of liquefied gas tanker.

9.- Teaching aids.

- Instructor manual.
- Appropiate film on fire fighting and cargo operation.
- Film, transparencies and slide projectors.

10.- Duration of a course.

The duration of a course should be 2 weeks of 10 working days with a 6 lessons of 60 minutes per day.

11.- IMO References.

- 1978 STCW Regulation V/3 1-b Mandatory Minimum Requirements for the Training and Qualifications of Masters, Officers and Ratings of Liquefied Gas Tankers.
- ICS Tanker safety guide (liquefied gas).
- IMO Gas carrier code.
- IMO Medical first aid guide for the use in accidents involving dangerous goods.

12.- Text book references.

- Tanker safety guide for liquefied gas.
- Code of the safe working practices for merchant seaman.

<COURSE OUTLINE.

1.- Regulations and codes of practice.
2.- Characteristics of liquefied gas tankers.
3.- Cargo.
4.- Hazards and hazard control.
5.- Cargo calculation, loading, discharging, cooling down, warming up, sampling, inerting and gas freeing.
6.- Emergency operations.
7.- Repair and maintenance.> 1)

Remark: See in appendix on page 121 to 122 the Detailed Teaching Syllabus.

---

1) Taken from source 1 third part (see bibliography).

ADVANCED LIQUEFIED GAS TANKER OPERATION COURSE.

COURSE FRAMEWORK

1.-Scope

This course is intended for those masters, chief engineer officers, chief mates, second engineer officers and, if other than the foregoing, any person with the immediate responsability for loading, discharging and care in transit or handling of cargo, in addition to the prevision of paragraph .1, resolution V/3 of the STCW Convention 1978, and covers the mandatory minimum training requirements prescribed by Regulation V/3 paragraph 2-b of the STCW convention, and includes liquefied gas tanker safety, fire safety measures and systems, pollution prevention and control, operational practice and obligations under applicable laws and regulations.

2.- Objective.

Those successfully completing this course should be able to serve on liquefied gas tankers in a capacity other than officers and ratings, and may have the immediate responsibility for loading, discharging and care in transit or handling of cargo.

3.-Entry standards.

This course is open to experienced seafarers who have necessarily served on board a liquefied gas tanker as part of the regular complement., furthermore they must have completed an advanced shore-based fire fighting course approved by the Administration.

4.- Course certificate, diploma or document.

Provide that the course has been approved by the Administration, a participant who successfully completes it may be issued with a certificate or diploma attesting that he has completed the course specified in STCW convention regulation V/3 2-b and, if he is the holder or is to be issued with a certificate under the provisions of that convention, such certificate may be endorsed by the issuing Administration.

5.- Student number, limitation.

As recorded in section 5 of this same chapter on familiarization liquefied gas tanker course page 78.

6.- Staff required.

As recorded in section 6 of this same chapter familiarization liquefied gas tanker course page 78.

7.- Teaching facilities.

As recorded in section 7 of this same chapter familiarization liquefied gas tanker course page 78.

8.- Training aids.

One of each of the following items of equipment is required for classroom demonstration:

- Special gas detectors.
- Explosimeters.
- Oxygen analyser.
- Breathing apparatus.

9.- Teaching aids.

- Instructor manual.
- Slides and transparencies projector.
- Films.

- Several capacity plans and cargo lines of typical liquefied gas tankers (LNG, LPG, NH_3).

10.Duration of a course.

As recorded in section 10 of this chapter familiarization liquefied gas tanker page 79.

11.- IMO References.

- 1978 STCW regulation V/3 2-b Mandatory Minimum Requirements for the Training and Qualifications of Masters, Officers and Ratings of Oil Tankers.
- Liquefied gas tanker safety guide (ICS).
- Medical first aid guide for use in accidents involving dangerous goods (IMO).
- IMO Gas carrier code.

12.- Text book references.

- Code of safe working practices for merchant seaman.
- Tanker safety guide for liquefied gas.

<COURSE OUTLINE

1.- Basic chemistry and physics.
2.- Health hazards.
3.- Cargo containment.
4.- Operational procedures.
5.- Pollution.
6.- Cargo handling system.
7.- Ship operating procedures.
8.- Safety practices and equipment.
9.- Emergency procedures.> 1)

Remark: See in appendix on page 123 to 125 the Detailed Teaching Syllabus.

---

1) Taken from source 1 third part (see bibliography).

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the author wishes to clarify that in developing this paper, the intention is not to criticise the situation of the none existence of the defined minimum training requirements which both officers and ratings must possess for operating on board the Venezuela tanker fleet. On the contrary it was the realization of the importance and need for this type of education and training which gave rise to the idea.

It is expected that implementation of the proposed programmes would not be an easy task; however it is recognized that there is need to have all personnel properly trained, not only to satisfy the STCW Convention 1978 but also to reduce unsafe operational practices and pollution of the seas.

Furthermore, it would be necessary that there be cooperation and team work among the Maritime Administration, the Oil Companies and the Maritime Education and Training Authorities to operate the programme if it is to be successfull.

It is the recommendation that in the first case, the Ministry of Communication and Transport (Direccion General Sectorial de Transporte y Transito Acuatico) should be responsible for the creation of the relevant regulations to make the training and qualifications compulsory.

Secondly, Lagoven, Maraven and Corpoven should be responsible both for major funding and providing some of

their qualified staff as teachers and instructors.

Thirdly, the maritime education and training authorities through the Nautical School and Post-graduate School should be responsible for the development of syllabus and contribute the human and material resources to ensure the proper implementation and supervision of these training courses.

The success of the programme being proposed can contribute in a large measure to the further advancement of the Merchant Marine as well as the economic and general development in Venezuela.

EXAMPLE OF LESSON PLAN

COURSE..... LESSON NUMBER..... DURATION.....

TRAINING AREA.....

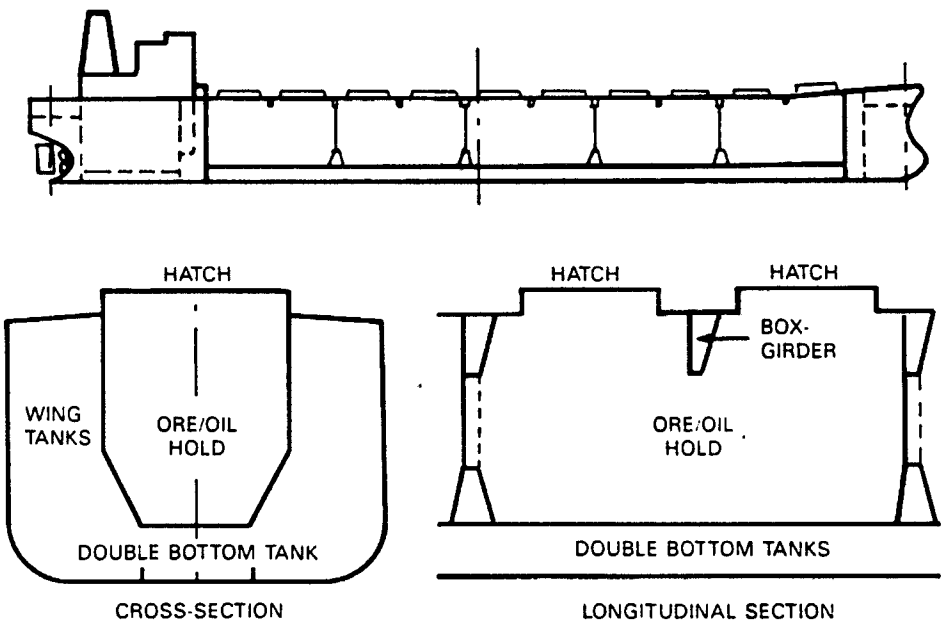
MAIN ELEMENT SPECIFIC LEARNING OBJETIVE (IN TEACHING SEQUENCE WITH MEMORY KEYS)	TEACHING METHOD	TEXT BOOK	IMO REF.	A/V AID	INSTRUCTOR GUIDELINES	LECTURE NOTES	TIME MINS
3.0 OIL CARGO COINTAINMENT AND HANDLING		B1	R1-			USE B1	5
3.6 MEASUREMENT OF CARGO LEVEL	Lecture	Pa.19.2	V/1,1(b)			AND B3	
EXPLAIN *SOUNDING-ACTUAL DEPTH OF OIL*		Pa.19.5	R2-				
EXPLAIN *ULLAGE-DISTANCE FROM SURFACE*		B3-	Pa.8,2(e)				
OF OIL TO TOP OF TANK.		P.35					
List Methods:		LECTURE	B1-	R1-			5
3.6.1 *Flexible tape*		Pa.19.2	V/1-				
Flexible, contained in *"wind out", "wind in"* case *not suitable* for *fast loading* - manpower *excessive* - too *slow*		Pa.19.5	1/b				
3.6.2 *FLOAT INDICATORS*			B3-	R2			
Indicates records - ullage directli - reasonable reability *modern* system uses *remote* read-out in *control room*			P.35	Pa 2(e)			
3.6.3 *PNEUMATIC*							5
Oil presure head in tank use to *indicate ullage remotely* by means of *air* or *inert gas* presure							
3.6.4 *HYDRAULIC*							
Oil pressure head in tank used to *indicate ullage directly* through a *fluid filled capillary tube* to a *gauge*							5

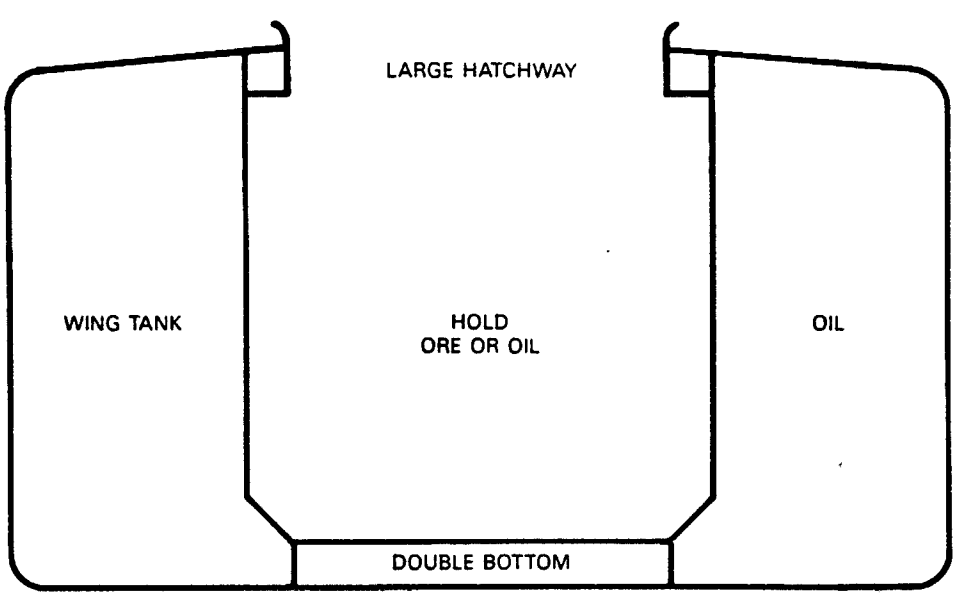
Note

Lecturer should *mention* that *all remote indicating gauges* are *affected by changes in environtmental* temperature, and *gauges* are *calibrated* for one *particular oil temperature*. Means are *built in* to the gauge to compensate for these effects.

Taken from source 2 (see bibliography).

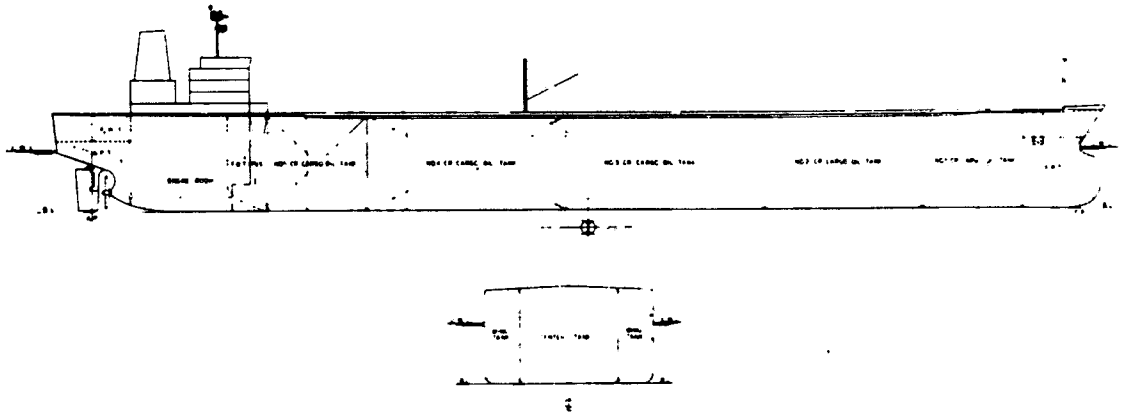
Ore/oil carriers (O/O ships)





OUTLINES OF TYPICAL TANKER VESSELS

Crude oil tanker

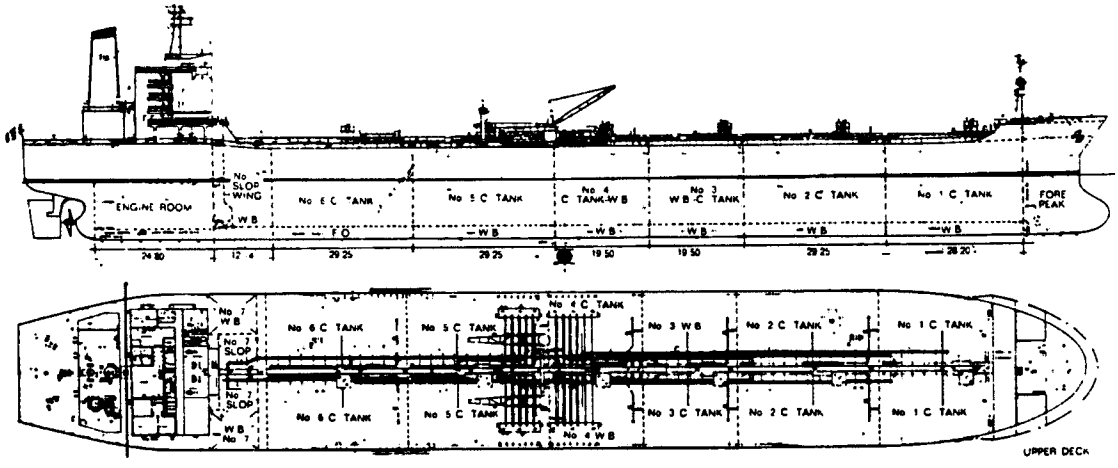


Tonnages and dimensions
Gross: ..... 60,000 tons
Deadweight (metric):
Design ..... 101,600 t
Scantling ..... 110,263 t
Length overall: ..... 248.00 m
Length b.p.: ..... 238.00 m
Breadth: ..... 40.50 m
Depth: ..... 22.50 m
Draught:
Design ..... 14.60 m
Scantling: ..... 15.60 m

Cargo capacities and facilities
Cargo oil: ..... 128,200 m³
Tanks: Five centre tanks for cargo oil; two slop tanks; wing tanks for water ballast.
Cargo handling: Three 3,000 m³/h × 125 m TH cargo oil pumps; one 300 m³/h × 125 m TH stripping pump

Machinery details
Main engine: ..... MAN-B&W 5L80MCE
Engine builder: ..... Mitsui Zosen
Output:
MCR: ..... 14,900 bhp at 78.0 rpm
NCR: ..... 13,410 bhp at 75.3 rpm
Fuel oil consumption: ..... 40.8 t/day
Service speed: ..... 14 knots
Generators: Two 560 kW diesel sets and one 560 kW turbo-generator.
Boilers: One 60 t/h × 16.0 kg/cm²g, saturated.

Products/crude carrier



Tonnages and dimensions
Gross: ..... 33,471 tons
Net: ..... 25,115 tons
Deadweight (metric):
Design: ..... 54,500 t
Scantling: ..... 67,500 t
Length overall: ..... 224.00 m
Length b.p.: ..... 212.70 m
Breadth: ..... 32.20 m
Depth: ..... 18.60 m
Draught:
Design: ..... 11.90 m
Scantling: ..... 14.00 m

Cargo capacities and facilities
Cargo oil: ..... 72,500 m³
Water ballast: ..... 23,500 m³
Tanks: Ten cargo tanks, four segregated ballast tanks and two slop tanks, six cargo segregations.
Cargo handling: One 600 m³/h hydraulic submerged pump in each cargo tank and in each amidships ballast tank; six electro-hydraulic power packs, each 900 hp at 1,200 rpm; one thermal oil system for cargo heating; inert gas system; fixed tank cleaning machines; two 1,200 m³/h ballast pumps.

Machinery details
Main engine: ..... Sulzer 6RND76M
Engine builder: ..... Astilleros Espanoles
Output:
MCR: ..... 13,160 bhp at 117 rpm
NCR: ..... 12,600 bhp
Fuel capacity: ..... 2,500 m³
Service speed: ..... 15.4 knots
Generators: One 1,700 kW set driven by a 2,580 bhp at 720 rpm diesel engine; one 2,300 kW set driven by a 3,440 bhp at 720 rpm diesel; one 1,600 kg/h at 6.5 kg/cm² exhaust gas boiler; one 1,500 kg/h at 6.5 kg/cm² oil-fired boiler.

Other details
Classification: Bureau Veritas + 13/3E + "Petrolier Haute Mer" Glace III + MOT, or equivalent Lloyd's, ABS, etc.
Complement: ... 48 plus six maintenance crew

DETAILED TEACHING SYLLABUS FAMILIARIZATION OIL TANKER COURSE.

1 THE TANKER.

1.1 INTRODUCTION.

List important stages in the development of tanker as:

.1 Carrying oil in barrels in conventional cargo ships.
.2 Construction of vessels to carry oil in bulk.
.3 Use of longitudinal divisions and transverse bulkheads to form tanks.
.4 Locating machinery aft.
.5 Increase in size to VLCC's and ULCC's.
.6 Transportation of liquefied gas and chemicals in bulk.
.7 Pollution problems and explosion/fire hazard leading to international controls.
.8 Increasing use of the training to improve safety and reduce pollution.
.9 The 1978 STCW Convention and its chapter V of that Convention.

1.2 TANKER TYPES.

Describes general arrangement of tankers which carry bulk cargoes of:

.1 Crude oil.
.2 Petroleum products.
.3 Bitumen.
.4 LNG.
.5 LPG.
.6 Ore/oil.
.7 Ore/bulk/oil.

DETAILED TEACHING SYLLABUS FAMILIARIZATION OIL TANKER COURSE.

1 THE TANKER.

1.1 INTRODUCTION.

List important stages in the development of tanker as:

.1 Carrying oil in barrels in conventional cargo ships.
.2 Construction of vessels to carry oil in bulk.
.3 Use of longitudinal divisions and transverse bulkheads to form tanks.
.4 Locating machinery aft.
.5 Increase in size to VLCC's and ULCC's.
.6 Transportation of liquefied gas and chemicals in bulk.
.7 Pollution problems and explosion/fire hazard leading to international controls.
.8 Increasing use of the training to improve safety and reduce pollution.
.9 The 1978 STCW Convention and its chapter V of that Convention.

1.2 TANKER TYPES.

Describes general arrangement of tankers which carry bulk cargoes of:

.1 Crude oil.
.2 Petroleum products.
.3 Bitumen.
.4 LNG.
.5 LPG.
.6 Ore/oil.
.7 Ore/bulk/oil.

1.3 TANKER TERMINOLOGY.

Defines terminology and explains abbreviations commonly used aboard tankers and in tanker terminals.

2 PETROLEUM PROPERTIES AND HAZARDS.

2.1 THE HYDROCARBONS STRUCTURE.

states that:

.1 Crude petroleum as discharged at the well head is a mixture of a large number of different hydrocarbon molecules.

.2 The molecules are termed "light" or "heavy" according to the numbers of carbon atoms forming the molecule.

.3 Very light molecules such as, methane, butane and propane tend to be gaseous under normal atmospheric conditions.

.4 Very heavy molecules such as asphalt and bitumen tend to be solid under normal atmospheric conditions.

.5 Intermediate molecules such as petrol (motor spirit) and diesel oil tend to be liquid under normal environment conditions.

.6 Very light molecules such as methane are extracted at the well head.

.7 The petroleum which remains after removal of products such as methane is termed 'crude oil'.

.8 Crude oil is a mixture of hydrocarbons which at normal atmospheric conditions are gaseous liquid and solid.

.9 In an oil refinery process, termed distillation, the crude oil is split into a number of fractions.

.10 Each petroleum fraction has a range of physical properties specific to itself.

2.2 PHYSICAL PROPERTIES OF PETROLEUM.

Defines in simple terms:

.1 Density.

.2 Viscosity.

.3 Pourpoint.

.4 Flashpoint.

.5 Vapour pressure/temperature relationship.

.6 Flammability.

.7 Explosive limit.

2.3 HAZARDS FROM PETROLEUM CARGO.

Potential for fire and explosion.

.1 States that ability of the petroleum to create vapour is a major factor.

.2 Describe the ability to vaporize as volatility.

.3 State that the volatility increases with temperature and becomes a maximum at the boiling temperature of the petroleum.

.4 States that when hydrocarbon vapour is mixed with oxygen (usually from the atmosphere) an explosive mixture is produced.

.5 States that a mixture of hydrocarbon vapour and air will only ignite and burn if its composition is within the *"flammable range"*.

.6 States that the concentration of hydrocarbon vapour present in air is used to define *"flammable range"*.

.7 States that the working flammable range of petroleum vapour/air mixture can be taken as from 1% to 8% by volume.

.8 States that the flashpoint of an oil indicates the lowest temperature at which the oil will give off sufficient hydrocarbon vapour to form a flammable gas mixture with air near the surface of the oil.

.9 States that the use of inert gas in cargo tanks can

reduce the oxygen content below that necessary for flammable mixture.

.10 Describe the flammability diagram.

.11 List the three essential necessary for a fire to commence as:

- Oxygen.
- Flammable material.
- Source of ignition.

.12 States that the three essentials may be represented by the sides of a triangle.

.13 States that only the vapour a flammable material will combine with oxygen to produce fire.

.14 States that the complete triangle represents active fire.

.15 States that the removal of any one side will extinguish the fire.

.16 States that the two main methods of controlling a fire are:

- Removal of oxygen (smothering).
- Cooling (reduction of ignition source).

.17 States the removal of the flammable material is usually not possible with petroleum in bulk.

.18 States that the use of an inert gas will displace oxygen.

.19 States that covering the surface of flammable material with a blanket of inert material will prevent oxygen making contact with the vapours from the flammable material.

.20 States that water in sufficient quantity can provide cooling.

Toxic effects.

.1 List the hazards to health as:

- skin contact with liquid petroleum.

- ingestion (swallowing) of liquid petroleum.
- inhalation (breathing) of liquid petroleum.
- inhalation of petroleum vapour.
- compounds of lead contained in the cargo.

.2 Lists precautions as:

- strict control of entry into pump rooms, cargo spaces and other enclosed spaces.
- through ventilation of any space to be confirmed before entry.
- use of adequate protective clothing.
- thorough cleansing of personal clothing after contact with petroleum.
- continual monitoring of atmosphere in working of spaces for petroleum vapour and hydrogen sulphide.

.3 Describes the toxic effect on personnel of skin contact, and ingestion (swallowing) of petroleum liquid and inhalation (breathing) of petroleum vapour.

.4 State that the skin contact with liquid petroleum produces irritation and dermatitis because of the removal of essential natural skin oil.

.5 States the ingestion of liquid petroleum into the stomach causes acute discomfort and nausea and that if liquid is inhaled into the lungs there is a serious risk of suffocation through interference with the normal oxygen/carbon dioxide transfer taking place during breathing.

.6 States that the liquid ingested will tend to vaporize and the vapour could be inhaled into the lungs.

.7 States that inhalation of petroleum vapour will produce narcosis, the main symptoms being, headache, eye irritation and dizziness, with very high concentrations leading to paralysis, insensibility and very possible death.

Oxygen Deficiency.

.1 States that the oxygen content of air is 21% by volume.

.2 States that the oxygen content in enclosed spaces may be lower.

.3 States that one of the reasons may be an inert atmosphere.

.4 States that the oxygen content may also be reduced due to chemical reactions.

.5 Lists such reactions as burning, rusting, paint drying.

3 OIL TANKER CARGO CONTAINMENT AND HANDLING.

3.1 TANKER ARRANGEMENT.

Describes the general arrangement of:

.1 Cargo tank layout.

.2 Pump-rooms.

.3 Segregated ballast tanks.

.4 Slop tanks.

.5 Cofferdams.

.6 Peak tanks.

.7 Deep tanks.

3.2 CARGO PIPING ARRANGEMENTS.

Describes:

.1 Internal piping in tanks and pump rooms.

.2 External piping (decklines).

.3 Cross-overs.

.4 By-passes.

.5 Ring main systems.

.6 Valves.

3.3 PUMPS.

Describes operating principles of:

.1 Reciprocating positive displacement pumps.

.2 Rotary positive displacement *"screw"* type pumps.

.3 Rotary positive displacement lobe and vane types.

.4 Roto-dynamic (centrifugal) pumps.

.5 Educators.

3.4 PUMP CHARACTERISTICS.

States suitability of the pump types listed in 3.3 for cargo handling in terms of:

.1 Maintaining flow at inlet low heads.

.2 Starting-up procedures.

3.5 DRAINING AND STRIPPING.

Lists the reasons for draining and stripping, tanks, lines and pumps, and states the pumps suitable for this purpose in terms of:

.1 Maintenance of flow at inlet under low head conditions.

.2 Ability to 'self prime'.

.3 Wear on moving parts with intermittent or fluctuating flow.

3.6 MEASUREMENT OF CARGO LEVEL.

Explain how the level of cargo in the tank can be obtained by 'sounding' or 'ullage' measurement and list the various methods in use for this as:

.1 Flexible steel or alloy tapes.

.2 Float indicators.

.3 Pneumatic gauges.

.4 Hydraulic gauges.

.5 Electrical capacitance gauges.

.6 Sonic gauges.

.7 Radar gauges.

3.7 CARGO HEATING.

.1 Explains that a particular viscosity range is required for storage and handling and that this is controlled through the temperature of the oil.

.2 Lists the methods of heating the cargo as the use of the:

- steam supplied to coils or other forms of extended heating surfaces, for normal petroleum cargoes.
- a mineral oil heating fluid for special (heavy) petroleum cargoes.

.3 States that leakage in heat exchanger pipes or matrix units will permit oil to contaminate the condensate system in steam-heating system or water to contaminate the oil cargo.

.4 States that dangers exist in heating cargoes (such as bitumen) if water is present in the cargo.

.5 States that steel heating coils suffer serious corrosive attack with crude oil cargoes.

.6 States that oil vaporization increases with increase of temperature.

4. OIL TANKER OPERATIONS.

4.1 LOADING CARGO.

.1 Explains need for compliance with all safety requirements.

.2 States control valves operate during loading according to planned sequence of filling tanks.

.3 States quantity of cargo checked by measuring by ullage.

.4 States venting of tanks to atmosphere controlled as necessary.

.5 Explains how and when samples are taken.

.6 States that events during operations are recorded.

4.2 LOADED VOYAGE.

.1 Explains how and when vapour pressures are checked and logged (non IGS vessel).

.2 States that cargo vapour vented to control pressure.

.3 States how temperature of cargo is controlled.

4.3 DISCHARGING.

.1 Explains the need for compliance with all safety requirements.

.2 States control valves operated during discharging according to planned sequence of emptying tanks.

.3 Explains why and how tanks are vented.

.4 States ballast loaded as required by discharging plan.

.5 Outlines draining and stripping procedures.

4.4 BALLAST VOYAGE.

.1 Explains the need for ballasting.

.2 States that a number of tanks are allocated for ballast.

.3 Explains the considerations for allocating the amount of ballast.

.4 States that some tankers have solely designated for ballast, served by a dedicated ballast system.

.5 Defines such tanks as segregated ballast tanks.

.6 Explains that if segregated ballast capacity is insufficient that additional ballast is taken in cargo tanks.

.7 States that such ballast is put in dirty cargo tanks.

.8 States that such ballast is heavily contaminated with oil.

.9 Explains why the ship upon arrival in the loading port

may only have clean or segregated ballast on board.

.10 Explains the operations for changing ballast.

.11 Explains how the sloptank is filled with an oily water mixture.

.12 Explains the need to decant the sloptank.

.13 Describes generally the decanting procedure.

.14 States that the remainder of the sloptank may be utilized for the carriage of cargo.

.15 Defines the process of changing ballast and decanting of sloptanks and loading sloptanks as the load on top procedure (LOT).

4.5 TANK CLEANING.

.1 Lists the reasons for tank cleaning.

.2 States that tanks cleaning machines are used.

.3 States that there are portable and fixed tank washing machines.

.4 Describes the working of tank washing machines.

.5 States that tanks may be cleaned with water or crude oil.

.6 States that on the ballast voyage only water, sometimes with chemicals is used.

.7 States that hot or cold water may be used.

.8 States that the tanks washing system incorporates a water heater.

.9 States that tanks washing must be carried out in a non-explosive atmosphere.

.10 States that this may be an inert or, alternatively, too lean or too rich atmosphere.

.11 Explains too rich and too lean atmospheres.

.12 States that if an inert gas system (IGS) is fitted and operating, tank washing should take place in an inert atmosphere.

.13 States that if an IGS is not fitted, tankwashing must

take place in a too lean atmosphere.

.14 Describes ventilating to a too lean atmosphere as gas freeing.

.15 Explains that gas freeing should be continued during tank washing.

.16 Explains that the tank washing water is tranferred to the sloptank.

.17 Describes the use of the slop tank in the open cycle mode.

.18 Describes the use of the slop tank in the recirculation mode.

.19 Describes line flushing.

4.6 CRUDE OIL WASHING (COW).

Describes the use of tank washing equipment using high pressure jets of crude oil from the cargo to dissolve and remove cargo residues and deposits which cling to the cargo tank internal surfaces and fittings.

4.7 USE OF INERT GAS.

States that:

.1 Inert gas is used in cargo tanks to replace the air, and thereby oxygen.

.2 The inert gas supplied should have an oxygen content of no more than 5% by volume.

.3 Cleaned, cooled boiler fluegas if often is used for this purpose, its main constituents being nitrogen and carbon dioxide.

.4 Alternatively, cleaned and filtered combustion gas from an oil burning gas generator can be used.

.5 The inert gas is supplied continuously to all cargo and slop tanks.

.6 It is important to keep cargo tanks and slop tanks inerted at all times.

4.8 PURGING AND GAS FREEING.

.1 Lists the reasons for gas freeing.

.2 States that gas freeing is usually done by mechanical means.

.3 States that such means may be portable fans or a fixed system.

.4 States that the IGS may be used for gas freeing.

.5 Defines gas freeing as the replacement of hydrocarbon vapours or inert gas by air.

.6 Explain that after cargo discharge hydrocarbons vapours remain inside a cargo tank.

.7 States that the hydrocarbon vapours are mixed with inert gas on an IGS fitted ship or with air in a ship not so fitted.

.8 States that in an inerted cargo tank there is no explosive atmosphere.

.9 States that during gas freeing operations care must be taken that the tank atmosphere does not come within explosive range.

.10 States that soot particles in inert gas create additional ignition hazard in an explosive tank atmosphere.

.11 Explains show purging a tank with inert gas will prevent development of an explosive atmosphere in a cargo tank.

.12 States that gas freeing a non inerted tank will result in the tank atmosphere being for some time in the explosive range.

.13 States that oil tankers must be supplied with meters to check on oxygen content, hydrocarbon content and toxic gas content.

.14 States that meters are available showing percentage lower flammable limit (LFL) by volume.

4.9 TANK CLEANING AND GAS-FREEING FOR REPAIRS.

.1 States that procedures under 4.5 and 4.8 must be carried out.

.2 States that before entering any tank the atmosphere must be checked for oxygen content, hydrocarbon content and after carrying some cargoes, toxic gas content.

.3 States that oxygen content must be 21% by volume.

.4 States that the hydrocarbon content must be less than 2% LFL.

.5 States that after tank washing, manual residue removal may be necessary.

.6 States that residue removal generates more hydrocarbon gas.

.7 Explains that therefore gas freeing operation must be continuous.

.8 States that adjacent bulkheads and pipelines may constitute additional hydrocarbon gas sources.

.9 States that the inert gas piping to the tank should be blanked off.

.10 States that for contractor's work a gas free certificate in needed from a qualified chemist.

.11 States that for hot work an additional hot work permit is required.

.12 States that such certificate and permit must be reissued every day that work is carried out, or such lesser period as the port authority stipulates.

5 POLLUTION.

5.1 CAUSES OF MARINE POLLUTION.

.1 States that marine pollution at sea can occur from:

- stranding and collision.
- lightening operations.

- tankwashing and line flushing.
- deballasting.

.2 States that marine pollution in port can occur from:

- leaking hoses and loading arms.
- overflow from tanks.
- equipment failure.
- improperly set sea valves.

5.2 PREVENTION OF MARINE POLLUTION.

.1 States that to prevent pollution at sea:

- there are requirements for the discharge of oil into the sea which must be complied with.
- in order to comply with these requirements LOT procedures must be observed during deballasting, decanting and tank cleaning operations.
- most crude carriers must crude oil wash their cargo tanks to minimize oily wastes.

.2 States that to prevent pollution in port:

- ship movements alongside must be restricted by adjusting moorings.
- all pipelines, joints and valves must be kept under observation whilst handling cargo.
- catchment trays must be fitted or placed at vulnerable points (hose connections, for example).
- Strict control must be exercised whilst loading to prevent overflow of tanks.
- all scuppers must be closed to prevent a discharge of oil from the deck overboard.
- all valves and blanks must be checked prior to cargo operations.
- the valves not used should if possible be secured.
- Sea valves not used should be closed by double valves or blanked off.
- in cases where oil is spilt cargo operations must be

stopped and warning given to all involved.

Air Pollution.

.1 States that hydrocarbon vapour collects above the surface of the oil.

.2 States that the vapour/air mixture is displaced during loading, ballasting, gasfreeing and tank washing operations.

.3 States that hydrocarbon gas and inert gas may be considered air pollutants.

.4 States that no measures are usually taken against air pollution.

.5 States that in some ports regulations exist restricting air pollution from oil tankers.

.6 States that certain displacement and containment measures can be taken to restrict air pollution.

6 SAFETY.

6.1 PRECAUTIONS FOR PROTECTION OF PERSONNEL AND SHIP.

.1 List precautions against fire as:

- prohibiting smoking except in designates spaces.
- absolute prohibition of smoking in calm weather.
- prohibiting any form of naked light.
- prohibiting non-safety matches and gaslighters.
- requiring the use of approved type of safety matches under strictly controlled conditions.
- permiting only approved design of galley equipment to be used.
- prohibiting of battery powered personal equipment.
- exercising close control over the condition and use of tools and equipment.
- requiring all electrical, lighting, motor, portable lamps, torches, etc; and other equipment to be of an

approved type.

- stopping all cargo operations if an electrical storm is imminent or taking place.
- maintaining over pressure in accommodation.
- keeping accommodation doors and windows closed.

lists dangers from:

- accumulations of oily rags, waste and other flammable material.
- cathodic protection units becoming detached and falling in cargo spaces with the possibility of spark generation.
- the use of aluminium paints on areas of rust-generating heat.
- the generation of static electricity and creating of possible electrical discharge by:
  .flow of petroleum (non conductor) through metal (conductor) pipelines.
  .concentration of static at oil free-surface during loading.
  .water washing of cargo tanks.
  .lowering sampling or ullaging equipment into tank.
  .water slugs from a high capacity tank washing machine.
  .surging of ballast water.

6.2 FIRE FIGHTING.

.1 Lists the media normally used to fight and control fires as:

- water in the form of:
  .jet
  .spray
  .fog
- foam, formed from:
  .chemical reaction (chemical foam)

.entraining foam forming material and air into stream of water (air foam).

- halon (inhibiting effect on combustion).
- carbon dioxide gas.
- steam.
- dry-inert powder.
- sand.

.2 States the vital importance of applying the correct media to particular types of fire.

.3 States for an oil fire that the correct media to apply are:

- foam.
- inert gas.
- water fog.
- steam.
- dry-inert powder (small fires).
- sand (small fires).

.4 States for a fire involving electrical apparatus which has not been isolated from the electrical supply (danger of electric shock), the correct media are:

- inert gas.
- dry inert powder.
- halon.

.5 States that the electrical apparatus is isolated from electrical supply, any suitable medium could be used.

.6 States that water in the form of wide angle spray (diffuser nozzle) can be used to shield personnel from radiant heat.

6.3 SAFETY EQUIPMENT AND ITS USE.

demonstrate use of:

- resuscitator.
- self-contained compressed air breathing apparatus.
- portable oxygen meter.

- protective clothing.
- explosion meter.
- toxic gas meter (chemical absortion tubes).

6.4 EMERGENCY MEASURES.

.1 States that the alarm signals are given in case of:
- outbreak of fire.
- spillage of oil.
- CO_2 discharge in engine room or pumps rooms.
- inert gas, oxygen level high.
- high level of oil residues in overboard discharge.

.2 States that planning and preparation are essential for dealing successfully with emergencies and lists the information which should be readily available as:
- type of cargo and its disposition.
- location of other hazardous substances.
- general arrangement plan of the ship.
- stability information.
- fire-fighting equipment location and instructions for its use.

.3 States that the location of all safety equipment should be known to all crew members such as:
- breathing apparatus.
- protective clothing.
- approved portable electric lights.
- instruments for measuring oxygen and others gases.
- first-aid kits.
- tank evaluation equipment.
- fire-fighting equipment with instructions for use.

.4 States that towing hawsers should be prepared, hung off offside over bow and stern ready for use.

.5 States that a plan for dealing with outbreak of fire or an explosion must be prepared and all crew member briefed on its operation.

.6 States the need for an emergency organization and lists the main components of the organization as being:

- a command centre located in a normally safe position on the vessel with communication facilities and equipment readily available.
- an alternative emergency position identified for use if the normal command centre location cannot be occupied.
- a senior officer must be identified as being in control during the emergency, with another senior officer being identified as his deputy.
- an emergency team should be formed from crew members under the control of a senior crew member to take actions as directed from the command centre.
- a second emergency team party should be formed to assist the emergency team as necessary.
- an engineering emergency team should be formed under the control of a senior engineer.

.7 States the need for realistic drills to be undertaken periodically.

.8 States that in an emergency important actions to take would include:

- giving audible and visual warnings that an emergency exist by means of:
  .bells, whistles, klaxons, etc.
  .flashing lights.
  .advising the command centre of the location and nature of the emergency.
  .stoping any cargo related operations, closing valves and openings in tanks.
  .removing any craft alongside.

.9 States that personnel in the vicinity of the emergency should take appropriate action to try and control the

incident until the emergency team can take over.

.10 states that all equipment which may be needed in an emergency must be maintained in good order and always be ready for use and lists important items as:

- fire-fighting equipment.
- breathing apparatus.
- protective clothing.
- alarm systems.
- communications systems.
- arrangement plans.

7 DISCUSSION/ASSESSMENT.

To be arranged by course presenter.

Pages 89 to 108 taken from source 2 (see bibliography).

DETAILED SYLLABUS IN ADVANCED OIL TANKER OPERATION COURSE.

1 COMPREHENSION OF FIRE AND EXPLOSION HAZARDS AND THE APPROPIATE PREVENTION MEASURES.

.1 Answer simple questions on fundamental facts regarding physics and chemistry of flammable liquids.

.2 Explain and draw sketches on the behaviour of flammable vapours inside and outside of cargo tanks under various conditions.

.3 Answer questions on the nature of electrostatic charging, on the mechanism of electrostatic ignition and on appropriate counter measures.

.4 Explain and give the reason for the practice of bonding, earthing and isolating and the use of cathodic protection.

.5 Answer simple questions on fundamental physical facts regarding the development, extension and extinguishing of oil - and oilgas - fires on tankers.

.6 Explain the prescribed firefighting equipment and firefighting techniques in oil tankers.

.7 Discuss the nature of the 1969 tanker explosions and the results of their investigation.

.8 Discuss the nature of the OBO-explosions and the results of their investigation.

2 UNDERSTANDING OF PRINCIPLE, FUNCTION AND MAINTENANCE OF TECHNICAL INSTALLATION AND EQUIPMENT.

.1 Calculate the flow rate from manometer-reading of a given centrifugal pump and answer questions on loss of suction phenomena and the flow rate/temperature relation of the pump.

.2 Explain (or if available demonstrate) the starting and parallel operation of centrifugal pumps and answer questions on routine checks and maintenance of centrifugal pumps.

.3 Explain the function of two typical automatic stripping devices for centrifugal pumps and the appropriate operational checks and maintenance using a manual.

.4 Explain (or demonstrate) the function and operation of stripping ejectors with due regard to the influence of the attached piping system.

.5 Explain the function and operation of reciprocating pumps and the necessary measures of control and maintenance using manual.

.6 Answer questions on fundamental facts regarding flow resistance, pressure distribution in piping system and the dynamic phenomena of pressure surge and pressurized gas pockets.

.7 Draw sketches and explain the function and maintenance of pressure/vacuum relief devices on cargo tanks and piping systems.

.8 Answer questions on the construction, function and maintenance of different types of valves, couplings and packing devices.

.9 Answer the questions on the overall layout of hydraulical systems for the activation of valves and similar equipment, the appropriate safety factors and the necessary checks and maintenance.

.10 Explain the principles of three customary ullaging devices and the necessary maintenance using the manufacturer's manual.

.11 Explain the construction and operation of a given tankwashing machine using the manufacturer's manual and the features of single nozzle and twin nozzle machines.

.12 Draw and explain a sketch on the layout of an inert-fluegas-system including safety devices and controls.

.13 Draw and explain a sketch on the layout of an inertgas-generator-system including the controls and safety devices.

.14 Describe the starting-up and shutting-down procedures of inertgas system, the necessary checks and maintenance.

.15 Explain the principles of customary gasmeasuring instruments.

.16 Demonstrate the calibration and the use of customary gas measuring instruments.

.17 Answer questions of function, checks, operation and maintenance of other safety equipment, above all breathing apparatus, resuscitation set and rescue equipment.

.18 Answer questions on the use of electronical stresscalculators and its test-procedure using an appropriate manual.

3 KNOWLEDGE AND APPLICATION OF LAWS AND CONVENTIONS RELATED TO POLLUTION PREVENTION.

.1 Answer questions on the present regulations provided by the *"International Convention for the Prevention of Pollution of the Sea by Oil"*.

.2 Answer questions of the future provisions to be established by the *"International Convention for the Prevention of Pollution from Ships"* 1973, including the provisions established by the *"International Conference on Tanker Safety and Pollution Prevention"*.

.3 Answer the questions on the *International Convention*

on the Establishment of an International Fund for Oil Pollution Damage, and on the *International Convention on Civil Liability of Oil Pollution.*

.4 Answer questions on the *"Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution"* (TOVALOP) and on the *"Contract Regarding an Interim Supplement to Tanker Liability for Oil Pollution"* (CRISTAL).

.5 Explain measures to be implemented by the master of an oil tanker in the case of an oil pollution by his ship.

.6 Explain and demonstrate the correct keeping of the oil record book.

4 ABILITY TO PLAN AND PREPARE THE IMPLEMENTATION OF OPERATIONAL PROCEDURES WITH DUE REGARD TO SAFETY STANDARDS.

.1 Explain the fundamenmtal physics and the determined rules on safe mooring of large tankers.

.2 Demonstrate the correct precalculation of cargo loading on a given ship.

.3 Explain the general safety and pollution prevention precautions to be met in a loading or discharging part using an acknowledged check list.

.4 Put down a workable plan of deballasting and loading procedure for a given ship.

.5 Explain the organization of properly topping up the ship including the *"last tank"* procedure.

.6 Explain the fundamental rules on cargo heating during the loaded passage.

.7 Explain the general safety and pollution prevention measures related to a lightering operation.

.8 Explain the prescribed preparation measures for crude

oil washing.

.9 Put down a workable plan of a full discharging and ballasting sequence including crude oil washing for a given ship.

.10 Explain the features of different crude oil washing with regard to different outfit associated system (ullaging, stripping).

.11 Explain the principle and procedure of stripping tanks and draining lines and pumps for a given ship.

.12 Explain proper ballasting and line flushing procedures for a given ship.

.13 Select the proper method of gas exchange procedure in cargo tanks with due regard to the object of the operation and to the layout of the inert gas distribution system.

.14 Explain the general water washing procedures with due regard to accepted safety standard and pollution prevention regulations.

.15 Explain the complete processing of the ship's slop tanks with respect to pollution prevention regulations.

.16 Explain the agreed preparations and safety measures for hot repairs in the cargo areas.

.17 Explain and discuss safety precautions for visual inspection and repair work in cargo tanks or in the pump room.

.18 Explain and discuss the appropriate measures at an inert gas plant breakdown during discharging.

.19 Explain and discuss the appropriate handling of oil leakages into permanent ballast tanks.

5 ABILITY TO ORGANIZE AND SUPERVISE PERSONNEL ACTIVITIES FOR REGULAR AND EMERGENCY PROCEDURES INCLUDING THE NECESSARY TRAINING OF THE CREW.

.1 Put down a plan for personnel assistance in port regarding loading or discharging operations with given examples of conditions (crewlist, technical equipment, handicaps).

.2 Explain the personnel assistance in connection with work in enclosed spaces with due regard to physical loads.

.3 Describe the crew training procedure for rescue from enclosed spaces.

.4 Describe the crew training for resuscitation.

.5 Explain the personnel assistance to measures for handling an oil spillage on deck.

.6 Describe the teaching and training of the crew for fire-and explosion prevention.

.7 Explain the personnel assistance to fighting an oil-or gas-fire on deck.

.8 Explain the personnel actions for rescue measures after a collision with subsequent fire.

Pages 109 to 114 taken fron source 1 first part (see bibliography).

DETAILED SYLLABUS IN CHEMICAL TANKER FAMILIARIZARTION COURSE.

1 SHIP DESIGN AND EQUIPMENT.

.1 Codes and regulations concerning Chemical Tanker Construction, equipment and classification.

.2 Tank arrangement.

.3 Tank coatings.

.4 Pipeline and pumping system.

.5 Tank cleaning and venting facilities.

.6 Electrical equipment.

2 CARGO PROPERTIES AND REACTIONS.

.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 Chemical properties and reactions, especially chemical structure, symbols and nomenclature, chemical groups, reations conditions, interaction, catalysis, polymeration, inhibitors, reactions with water and air.

.3 Toxicity of chemicals, toxicity limits (MAC, TLV, LD_{50}).

.4 Identification of chemicals, utilization of chemical dictionaries, handbooks and codes, determination of properties.

3 OPERATIONAL PROCEDURES.

.1 Loading and discharging.

.2 Cargo calculation and stowage.

.3 Tank cleaning and gas freeing.

.4 Ship/shore communication, port regulations.

.5 Safety control.

4 HAZARD AND HAZARD CONTROL.

.1 Explosion and flammability risk.

.2 Health hazard.

.3 Reactivity hazard.

.4 Tank corrosion.

.5 Environmental pollution.

.6 Safety equipment and personal protection.

.7 Measuring instruments.

5 EMERGENCY OPERATIONS.

.1 Emergency organization plan.

.2 Fire-fighting on board chemical tankers.

.3 Collision and grounding situations.

.4 Tank leakages.

.5 First aid measures.

.6 Rescue from enclosed spaces.

6 REPAIR AND MAINTANANCE.

Pages 115 and 116 taken from source 1 second part (see bibliography).

DETAILED SYLLABUS IN ADVANCED CHEMICAL TANKER OPERATION COURSE.

1 PROPERTIES AND REACTIONS OF LIQUID CHEMICAL CARGO.

.1 General characteristics of liquid chemical cargo.

.2 Properties of selected liquid chemicals:

- oxidizing agents.
- mineral acide.
- caustics.
- amines and amids.
- organic acids and anhydrides.
- esters.
- isocyanates.
- alcohols and glycols.
- aldehydes and ketones.
- phenols.
- olefines.
- paraffines.
- aromatic hydrocarbons.
- vinyl compounds.
- halocarbons.
- nitrocompounds.

2 CARGO CONTAINMENT.

.1 Containment system.

.2 Rules for construction, classification and equipment of chemical tankers.

.3 Tank structure.

.4 Tank material and coating.

.5 Double bottoms and cofferdams.

.6 Pumping and piping design.

.7 Slop tanks.

3 CARGO HANDLING SYSTEMS.

.1 Types of cargo pumps.

.2 Pipes and hoses.

.3 Sealing and gaskets.

.4 Tank venting and inerting facilities.

.5 Gas detecting and monitoring instruments.

.6 Cargo gauging systems.

.7 Cargo heating and cooling devices.

.8 Cargo sampling and control.

4 OPERATIONAL PROCEDURE.

.1 International and national codes and regulations.

.2 Port regulations and communication.

.3 Cargo stowage.

.4 Cargo calculation.

.5 Tank and cargo survey.

.6 Tank cleaning and gasfreeing.

.7 Safety check lists.

5 CARGO HAZARDS.

.1 Health hazards:

- ingestion.
- inhalation and skin contact of toxic chemicals.
- toxicity limits.
- short and long term effects.

.2 Fire and explosion hazard:

- flammable limits.
- flashpoint.
- autoignition temperature.

.3 Chemical reaction hazard:

- cargo interaction.
- polymerisation.
- catalysis.
- autoignition.

- coating interaction.
- corrosion.
- heat of reaction.

.4 Environmental pollution:
- cargo spillage.
- drifting vapour clouds.
- reaction with water and air.
- ecological impact.

6 SAFETY EQUIPMENT AND MEASURES.

.1 Measuring instruments:
- detecting and monitoring of vapour.
- gases and flammable mixtures.
- oxygen control.
- application.
- calibration and maintenance of measuring instruments.

.2 Protective clothes and equipment for safe cargo handling.

.3 Fire fighting measures and equipment.

.4 First aid measures:
- resuscitation.
- eye washing.
- skin cleaning.
- use of rescue sets.
- breathing apparatus.
- appliance of antidotes.
- rescue of enclosed spaces.

7 EMERGENCY PROCEDURES.

.1 Emergency shutdown of cargo operations.

.2 Emergency measures in case of fire and explosion.

.3 Emergency measures in case of cargo spillage.

.4 Emergency measures in case of chemical interaction and

polymerisation.

.5 Emergency measures in case of collision and strandings.

.6 Emergency plans:

- measure and timing schedules.
- personal assignment.
- life and health protection.
- ship/shore communication.

Pages 117 to 120 taken from source 1 second part (see bibliography).

DETAILED SYLLABUS IN LIQUEFIED GAS TANKER FAMILIARIZATION COURSE.

1 REGULATIONS AND CODES OF PRACTICE.

.1 Familiarization with the IMO Codes for construction and equipment of liquefied gas tanker.

.2 Rules for the Classification and construction of ships carrying liquefied gases in bulk.

2 CHARACTERISTICS OF LIQUEFIED GAS TANKERS.

.1 Ship design.

.2 Pipeline layout and ball-valves.

.3 Characteristics of cargo pumps, booster pump, vapourisers, heaters, liquefaction.

.4 Gas detection and monitoring systems.

.5 Electrical equipment.

3 CARGO.

.1 Elementary physics and chimestry of liquefied gases and their vapours.

4 HAZARDS AND HAZARD CONTROL.

.1 Causes of fire and explosion.

.2 Precaution.

.3 Hazards to the personnel.

.4 Hazards to the environment.

5 OPERATIONAL PROCEDURES.

.1 Cargo calculation, loading, discharging, cooling down, warming up, sampling, inerting and gas freeing.

.2 Pollution free operations.

.3 Ship/shore communications and safety checklists.

6 EMERGENCY OPERATIONS.

.1 Emergency shut down systems.

.2 Emergency organization and plans.

.3 Fire fighting at sea and in port.

.4 Action following collision, stranding.

.5 Emergency discharge of cargo.

.6 Rescue from enclosed spaces.

7 REPAIR AND MAINTENANCE.

Pages 121 and 122 taken from source 1 third part (see bibliography).

DETAILED SYLLABUS IN ADVANCED LIQUEFIED GAS TANKER OPERATION COURSE.

1 BASIC CHEMISTRY AND PHYSICS.

.1 Properties and characteristics of liquefied gases and their vapours.

.2 Properties of single liquids.

.3 Nature and properties of solutions.

These properties in relation particularly to the following gases:

- acetaldehyde, ammonia, butadiene, butane/propane mixtures, butylenes, chlorine, dimethylamine, ethane, ethylamine, ethyl chloride, ethylene, ethylene oxide, methane, methyl acetylene-propadiene mixture, methyl bromide, methyl chloride, nitrogene, propane, propylene, refrigerant gases, sulphur dioxide, vinyl chloride.

2 HEALTH HAZARDS.

.1 Toxicity.

.2 Hazards of skin contact, inhalation and ingestion.

.3 First aid and administering of antidotes.

3 CARGO CONTAINMENT.

.1 Principles of containment systems.

.2 Rules.

.3 Surveys.

.4 Tank construction, materials, coatings, insulation.

.5 Compatibility.

These principles of containment systems for the carriage of liquefied gases by fully pressurized method, semi-pressurized method and fully refrigerated method, as applicable to LNG, LPG and Chemical gases.

4 OPERATIONAL PROCEDURES.

.1 Regulations and codes of practice.

.2 Familiarization with IMO, national and relevant international codes.

.3 Port regulations.

.4 Importance of ship's emergency plan and allocation of responsibilities.

5 POLLUTION.

.1 Hazards to human life and to marine environment.

.2 Effect of specific gravity and solubility.

.3 Danger from vapour cloud drift.

.4 Jettisoning of cryogenic liquids.

.5 National, international and local regulations.

6 CARGO HANDLING SYSTEM.

.1 Description of main types of cargo pumps and piping arrangements and vapour return system, piping systems and valves.

.2 Explanation of pressure, vacuum, suction, flow, head, NPSH.

.3 Pipe mountings.

.4 General arrangements of typical LNG/LPG/NH_3 vessels.

.5 Temperature and pressure monitoring systems.

.6 Cargo vent and inert gas systems.

.7 Liquid re-circulation and re-liquefaction systems.

.8 Cargo gauging and instrumentation systems.

.9 Gas detection, monitoring and CO_2 systems.

.10 Cargo boil-off systems.

7 SHIP OPERATING PROCEDURES.

.1 Loading and discharging preparations and procedures.

.2 Check lists.

.3 Cargo condition maintenance on passage and in harbour.
.4 Segregation of cargoes and procedures for cargo transfer.
.5 Changing cargoes, tank cleaning procedures.
.6 Cargo sampling.
.7 Ballasting and de-ballasting.
.8 Warm up, cool down and gas freeing system.

8 SAFETY PRACTICES AND EQUIPMENT.

.1 Function, calibration and use of portable measuring instruments.
.2 Fire-fighting equipment and procedures.
.3 Resuscitation, escape sets, rescue equipment.
.4 Protective clothing and equipment.
.5 Entry into enclosed spaces.
.6 Precautions to be observed before and during repair and maintenance of cargo and control system.
.7 Supervision of personnel during potentially hazardous operations.
.8 Sources of ignition, certified safe electrical equipment.

9 EMERGENCY PROCEDURES.

.1 Emergency plan.
.2 Emergency shutdown of cargo operations.
.3 Emergency cargo valve closing systems.
.4 Action in the event of failure of systems or services essential to cargo.
.5 Action in event of collisions or strandings, spillages, envelopment of ship in toxic or flammable vapour.

Pages 123 to 125 taken from source 1 third part (see bibliography).

BIBLIOGRAPHY

1.- Kaps, H.; Bothe, G. and Schoppmeyer, D.: Model Training Programmes on the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 (STCW 1978), 1982.
Hazardous bulk liquid cargoes:
- Oil tanker,
- Chemical tanker and
- Liquefied gas tanker.

2.- Specialized Courses Oil Tanker Familiarization. First edition. Specialized course developed under the IMO-Norwegian programme, 1987.

3.- Seminar on the Practice of Marine Education and Training in Europe and the New IMO Requirements.
Published by the Nautical Institute with the assistance of the Hochschule fur Nautik Bremen, Amsterdam 5-6 June 1980.

4.- Morton, G.S. Tanker Operations. A Handbook for the ship's Officers. Second edition, 1984.

5.- Worldmark Encyclopedy of Nations, 6th ed. (1984), s.v. "Americas, Venezuela".

6.- Coronel, Gustavo, The Nationalization of the Venezuelan Oil Industry, 1983.

7.- International Convention on Standards of Training, Certifications and Watchkeeping for Seafarers, 1978. Published by IMO, 1982.

8.- Training Corporate Programme to Maritime Transport Personnel. Published by the CEPET (Venezuelan Oil Industry), 1986.

9.- Corkhill, Michael. Chemical Tankers The Ship and Their Market, 2nd. edition 1981.

10.- International Safety Guide for Oil Tankers and Terminals. Second Edition. International Chamber of Shipping, Oil Companies International Marine Forum, International Association of Ports and Harbours. 1984.