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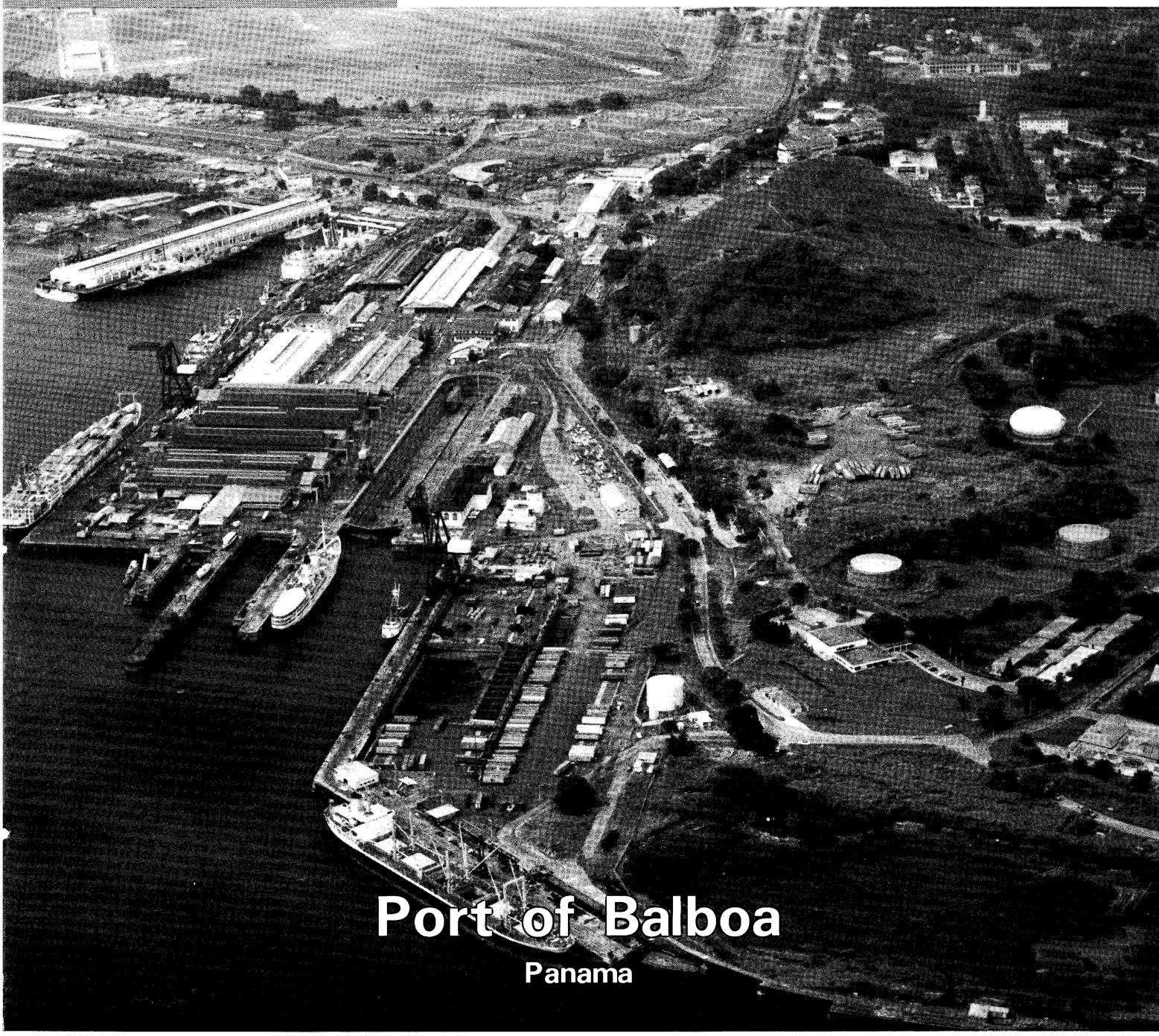
PORTS and HARBORS

October, 1982 Vol. 27, No. 10



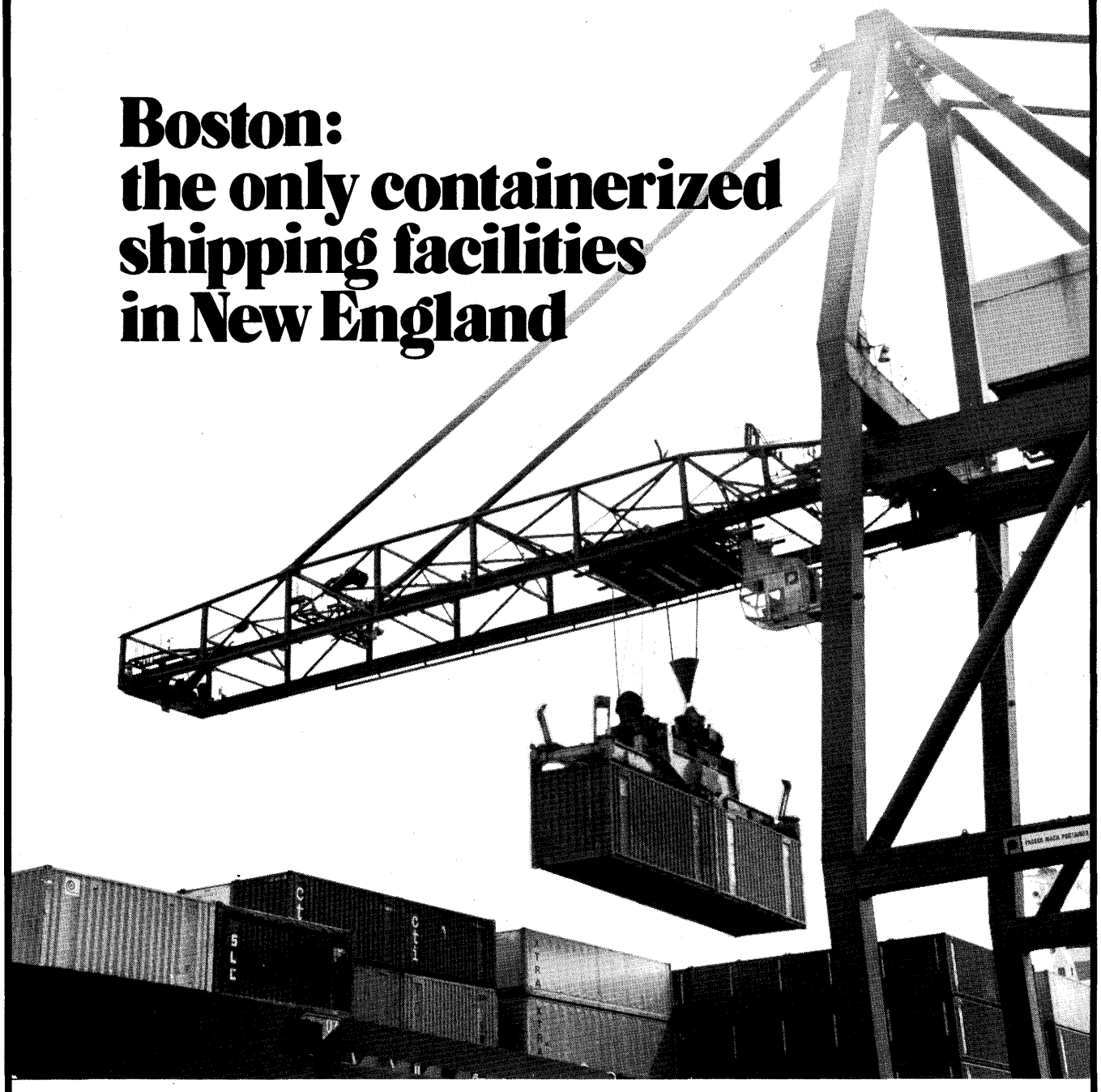
Port of Balboa

Panama

The Publisher: The International Association of Ports and Harbors

Kotohira-Kaikan Bldg., 2-8, Toranomon 1-chome, Minato-ku,
Tokyo 105, Japan

Boston: the only containerized shipping facilities in New England



For many shippers, Boston is not just the logical choice — it's the only choice. Moran and Conley Terminals provide efficient, fully competitive container services for 30 steamship lines. Last year, Boston handled 450 vessels at these modern facilities, and we're already at work on new facilities to significantly increase our capabilities. For complete information on steamship lines and other maritime services, contact — Martin C. Pilsch, Jr., Port Director.

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The Representative: Mattentwiete 2, 2000 Hamburg 11, Tel. 040/36 12 8-0

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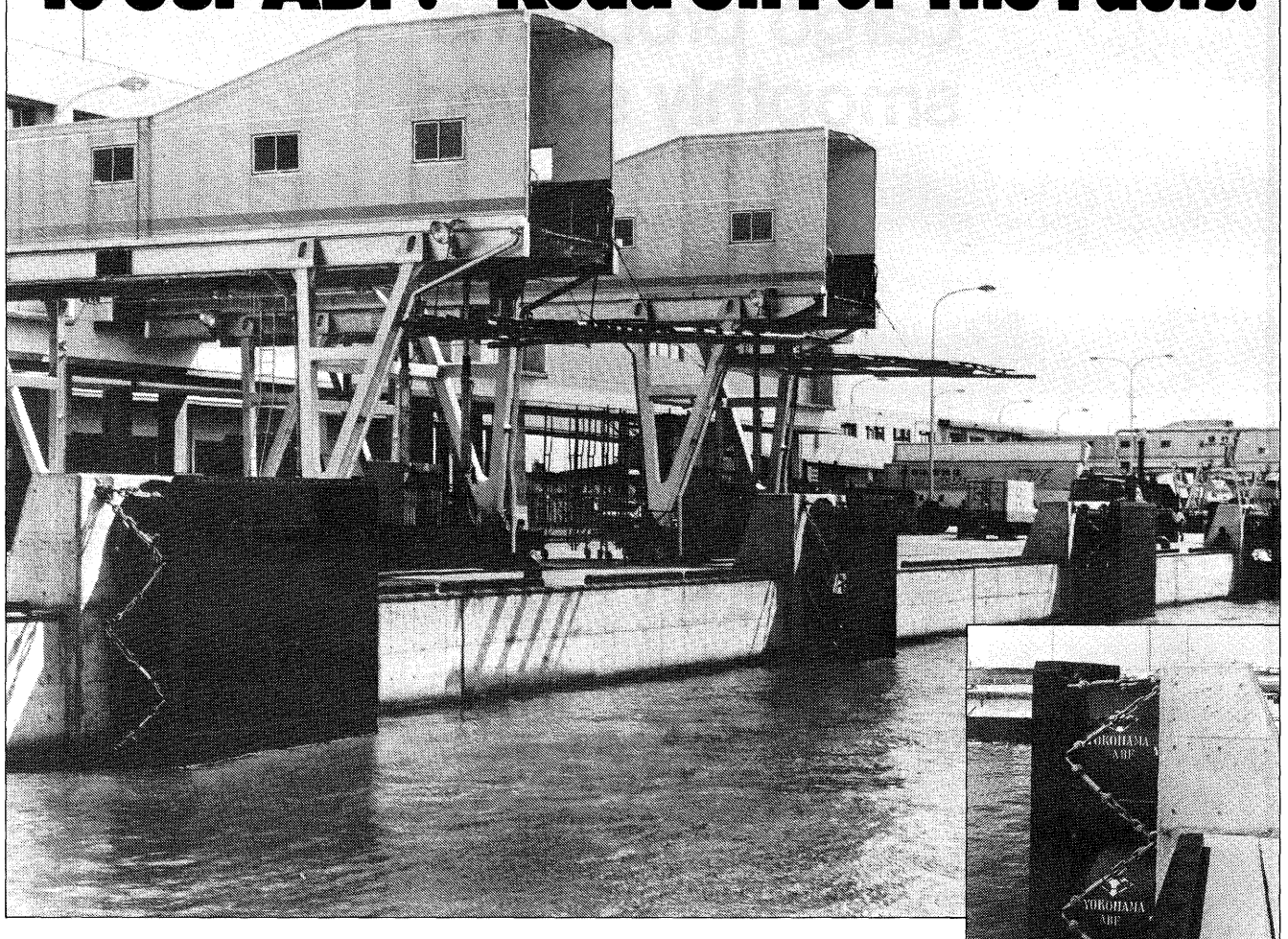


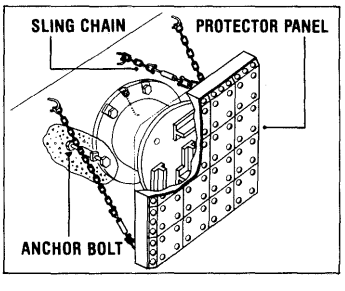
News from YOKOHAMA RUBBER— AIR BLOCK FENDER with PROTECTOR PANEL.

Because of their special structure, super tankers and vessels carrying LNG or LPG require a fender capable of reducing the tremendous surface pressure at the point of contact between the hull of the vessel and the fender.

Yokohama Rubber ABF-P (Air Block Fender with Protector Panel) satisfy this requirement and are especially recommended for installation at exposed ports and where weather conditions are severe.

Superior performance through design:

- Because of the compressive elasticity of air in the fender of ABF-P, they demonstrate a high absorption of energy and low reaction force.
- ABF-P demonstrate excellent performance under conditions of vessel movement caused by wind, swell and wave action during berthing and mooring. They also reduce stevedoring time.
- They display constant performance characteristics even when compressed at an angle.
- Because of the high compressive elasticity of air, they react smoothly to the forces generated when a vessel shifts positions to prevent shearing damage.



- They are applicable to a wide range of surface pressure and demonstrate excellent performance relative to tidal range.
- Lastly, ABF-P have a great reserve capacity for absorbing energy, so a hard jetty structure for installation is unnecessary.

YOKOHAMA

For further information, please contact your local agent of Yokohama Marine Products or write to;

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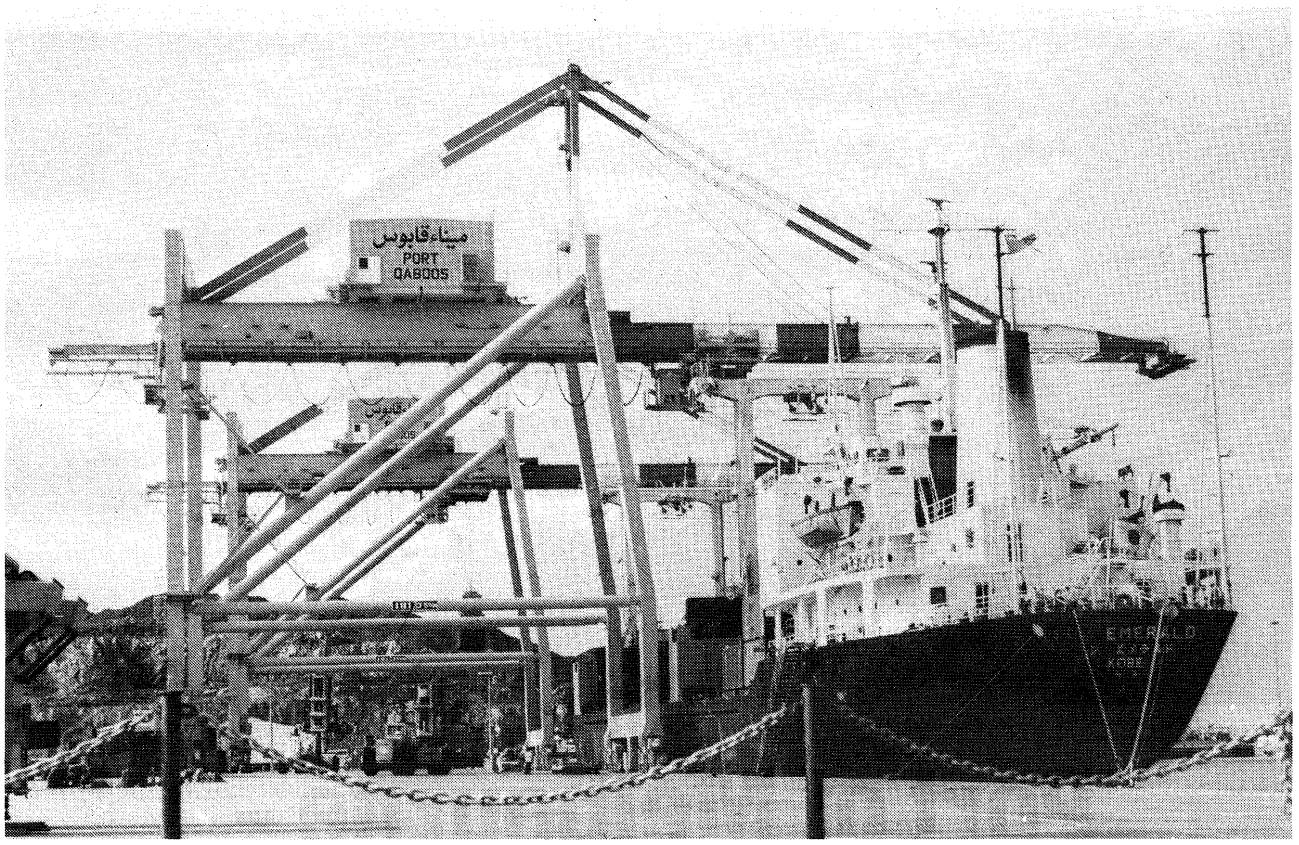
LONDON OFFICE: 4/5, Castle Court, Cornhill, London E.C. 3 ENGLAND. Tel: 01-283-1831/2/3 Telex: 885223 YOKOCO G



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The fastest turnaround port, with excellent
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Port Qaboos container terminal is capable of storing 1600 TEUs and handles container vessels with the help of two 35T gantry cranes with supporting quay equipments. Port Qaboos offers:

- ★ 9 deep water and 4 coaster berths
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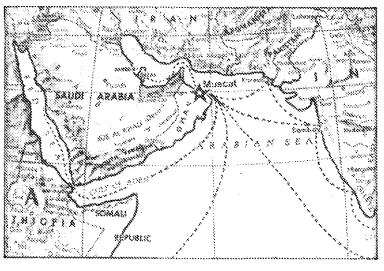

For more information contact:-
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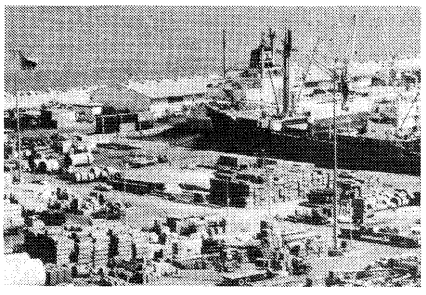
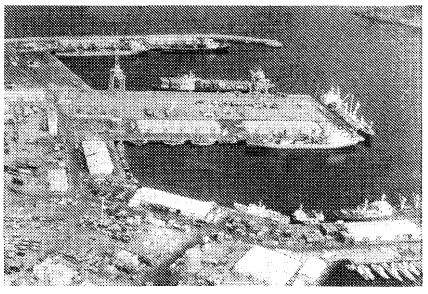
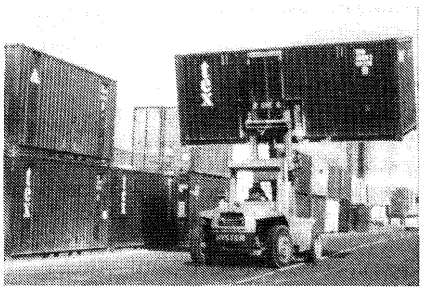
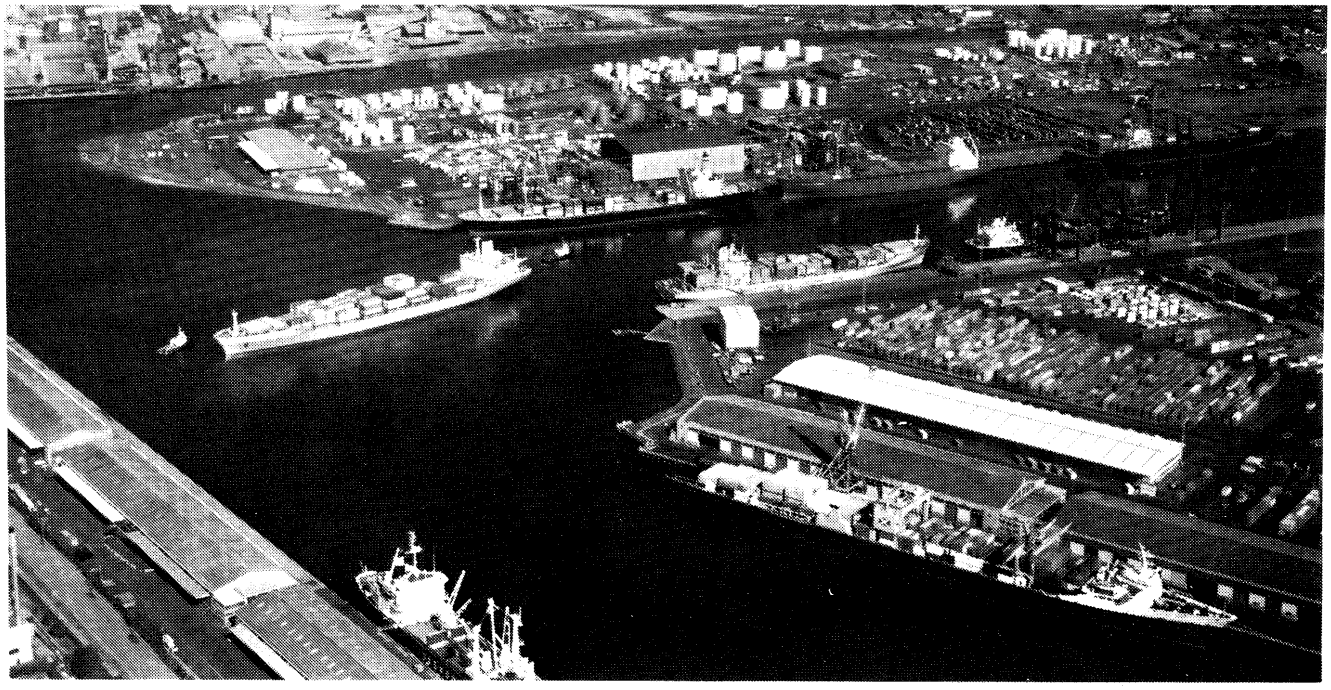
Port Services Corporation Ltd
P.O. Box 133 Muscat, Sultanate of Oman
Tel: 734001 Telex: MB 3233 MUSCAT

OHI 1606









The majority of the port's containerised cargo is handled through the seven berth, eight crane overseas container complex "Swanson Dock".

Port of Melbourne - gateway to Australia's trade

The Port of Melbourne is Australia's leading general cargo port and the largest container port in the Southern Hemisphere. It is centrally located on the Victorian coast and also serves Tasmania and areas of New South Wales and South Australia.

Historically it is one of the significant ports in the world. Part of its tradition is having the most modern facilities available. This includes a seven berth overseas container complex, Ro-Ro facilities, dual and general berths.

The Port Authority administration is financially self-supporting. All revenue generated is used to expand port facilities.

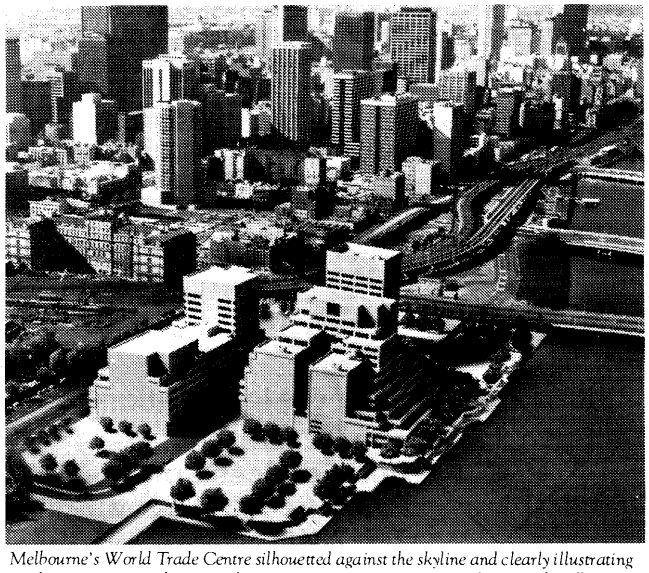
The Port of Melbourne serves 38% of Australia's population. Nearly 25% of Australia's trade passes across its docks. In the past 20 years general cargo has increased by 80%. It is estimated this trade will increase by a further 80% by the year 2000.

Statistics 1980/81

Revenue (AU dollars)	45 million
Total Trade (tonnes)	18,690,000
Container Trade (tonnes)	9,233,000
Container Trade (TEU's)	508,425
Ship Calls	2,330
Gross Tonnage of Ships	25,143,197
Assets (AU dollars)	326 million

World Trade Centre

One of the major projects being developed by the Port of Melbourne is the World Trade Centre. It is situated on the fringe of Melbourne's Central Business District. The complex will be completed in 1983 and will house specialists in every aspect of international trade.



Melbourne's World Trade Centre silhouetted against the skyline and clearly illustrating its close proximity to the Central Business District. In June 1982, the Port of Melbourne Authority moved its headquarters into the complex.

Trading with Australia will be far more efficient and profitable. The Centre will provide every service necessary for successful business and will become Australia's international trade headquarters.

For information:

The Secretary,
Port of Melbourne Authority,
G.P.O. Box 4721,
Melbourne, Victoria, 3001,
Australia.

O&M/PMA0021

PORTS and HARBORS

Published by

The International Association of Ports and Harbors

N.G.O Consultative Status, United Nations (ECOSOC, UNCTAD, IMO)

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October, 1982 Vol. 27, No. 10

CONTENTS

Cover: **Port of Balboa, Panama**

Price US $3.50 per copy
US $35.00 per year

The Port of New York and New Jersey's newest container terminal- Red Hook, Brooklyn, New York

Through the combined efforts of the State of New York, the City of New York and The Port Authority of New York and New Jersey, construction is now nearing completion on the new 1,000,000-ton capacity Red Hook Container Terminal in Brooklyn, New York, which has been leased to Universal Maritime Service Corp. This new container terminal, capable of handling Ro/Ro, as well as container and breakbulk vessels, is being completed at a cost of $20,000,000. It will have a 1,000-foot-long container berth supported by two cranes and 40 acres of upland area. Approximately 30,000 containers are expected to move via Red Hook each year and the facility will have the capability of handling trucks on a 100 percent appointment system. The site enjoys exceptional navigational advantages since it is located along Buttermilk Channel where the Corps of Engineers maintains a depth of 40 feet.

THE PORT AUTHORITY
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IAPH announcements and news

Membership campaign makes progress

The annual presidential campaign letter, which was drafted by Mr. J.P. Davidson, Chairman of the Membership Committee (Chairman of Clyde Port Authority, UK) has been dispatched from the Tokyo Head Office to 168 new ports. As in the past Mr. Mayne emphasizes the merit of the temporary membership status prior to joining the Association as a regular member.

The continuation of the temporary status, which started from 1980, was approved at the Aruba meeting of the Executive Committee, held in May of this year.

Based upon the report from the Secretary General, who presented to the EXCO meeting a report on some observations on the temporary member using 'Fisher's Method', it was agreed that the system had been effective in promoting regular membership.

The presidential letter dated August 25, 1982 was as follows.

Deat Sirs,

Following my communication to you last September, this is my second opportunity, as President of IAPH, to tell you about our Association and to invite you to join its effort to develop and foster good relations among the ports and harbors of the world.

With its ever-increasing membership, the influence of IAPH as a world-wide association of ports and harbors is becoming greater each year and I do hope that you will feel that the time is now appropriate for your port to consider once again the many advantages of membership of IAPH.

I am particularly pleased to inform you that we are continuing the "temporary membership" status which was introduced by the Association in 1980 at the reduced membership due to US$350 for one year, with a view to encouraging new members to join and become familiar with the Association and also enable them to participate in our next biennial conference at Vancouver from 4th–11th June 1983.

A brochure which describes in detail the structure and activities of IAPH as well as membership requirements is enclosed and I sincerely hope you will decide to join our Association and also to attend the Vancouver Conference.

I very much look forward to hearing from you.

With best regards,

Yours sincerely,

A.S. Mayne
President, IAPH

IAPH Dredging Task Force appeals for continued donations

The Secretary General's circular letter to the IAPH members was dispatched from the Tokyo Head Office on August 11, 1982. The circular explained the current situation of the IAPH Dredging Task Force undertakings and at the same time requested members continued support in the form of voluntary contributions to the second phase of the Fund.

The Secretary General's covering letter and the explanatory letter jointly signed by himself and Chairman Haar, Jr. the both dated August 11, 1982 are as follows.

To: Regular Member of IAPH

Dear Sirs,

Re: IAPH Dredging Task Force

Along the lines with the decision made at the IAPH Nagoya Conference 1981, the Association made an appeal for the Dredging Task Force Fund in September, 1981, and many ports responded to it with donations which, no doubt, was a great encouragement for the Dredging Task Force of IAPH, chaired by Mr. Herbert R. Haar, Jr., Assistant Executive Port Director, Port of New Orleans.

By the end of July, 1982, the target amount of the 1982 Fund for US$10,000 had been reached and this amount was recently sent to AAPA (American Association of Port Authorities) Dredging Task Force Fund from the IAPH Head Office as has been preliminary agreed upon.

The IAPH Executive Committee at its meeting in Aruba in May, 1982, decided to continue soliciting IAPH members, except those members in the United States (as they have already donated to AAPA Funds), to contribute to the Fund in view that the works relative to the London Dumping Convention should have to be carried on the coming years.

May I take this opportunity to seek your contribution to give your assistance in the 1983 Fund as has given in the 1982 Fund.

In making a request to you, I would point out that the financial participation is voluntary and this is not to be considered as any sort of special membership dues assessment. These funds will be used solely for the hiring of expert consultants such as oceanographers, environmental lawyers and marine biologists. As has been the case with the 1982 Fund, your contributions are requested to be made on basis of US$500 to US$750 from major ports (over 15 million tons volume per year) and US$100 to US$300 from all other ports, and to be sent to the IAPH Head Office through the following bank account.

IAPH-Dredging Task Force Fund
No. 532–0633887
The Bank of Tokyo, Uchisaiwai-cho Branch Office,
Tokyo 100, Japan

Also in this connection, at the meeting of the IAPH Dredging Task Force on May 3, 1982, it was suggested by the Task Force (and approved by the Committee on Port Safety, Environment and Construction on May 4) that a letter be sent to all IAPH members to help them understand the actual situation of the matter and further to solicite their assistance in briefing the appropriate ministries of their government on the work of the IAPH Dredging Task Force and its importance to their ports and national interest. The enclosed letter is prepared for this purpose.

We look forward to the generous support of as many IAPH members as possible towards the second phase of the Fund and the overall efforts by the IAPH Dredging Task Force.

With best regards,

Hajime Sato
Secretary General

To: Regular Members of IAPH

Dear Members,

The IAPH has recently expressed serious concerns about certain international constraints upon the dumping of waste at sea that, if applied too stringently to dredged material, could significantly interfere with essential port operations and, in some cases, could result in the actual closure of effected ports. In view of the collective impact of ports upon the world economy, and the critical role which ports play in worldwide trade and commerce, such effects would have serious impacts upon world economic and monetary systems and would threaten even greater disruption of the national and regional economies dependent upon such port operations.

The IAPH concerns relate to certain provisions of the London Dumping Convention (LDC), an international treaty that regulates the disposal of waste at sea which has been ratified by some 47 nations. Under current interpretations of the LDC, wastes (including dredged material) containing substances listed in Annex I to the Convention cannot be disposed at sea unless the listed substances are "rapidly rendered harmless" upon disposal or are present as only "trace contaminants". The concern of the IAPH relates to the situation where these exceptions do not apply but where ports are nevertheless faced with a need to dispose of dredged material and have no reasonable alternative means or sites for disposal other than the ocean. In that case, the IAPH has urged a consideration of the crucial role of ports in worldwide commerce and a recognition of the absolute necessity for local, regional, and national economies that essential port operations remain uninterrupted.

In recent meetings of the Contracting Parties to the LDC, the IAPH has presented (and urged Contracting Parties to approve and support) the use of "special care" measures for the safe disposal of highly contaminated dredged material. These special care measures include such protective techniques as "capping" contaminated dredged material with clean material, disposal in borrow pits followed by capping, disposal in hypersaline basins and other abiotic areas of the ocean, and similar measures. At the 6th Consultative Meeting of the LDC last fall, the Contracting Parties approved the use of such measure on a test basis, and agreed to keep these measures under continuing review and consideration. The Contracting Parties rejected, however, the further suggestion of the IAPH that, under certain circumstances, the need to dispose contaminated dredged material in the ocean may present a port with a true "emergency", which should permit disposal at sea under the "emergency" provisions of the Convention. This "emergency" issue still remains a vital concern of all ports.

It is imperative that the position of ports upon these critical issues be brought to the attention of your national authorities so that port concerns affecting your country can be appropriately represented and reflected at future meetings of the LDC. The IAPH urges you to appeal to the appropriate ministries within your government responsible for port operations and for attendance at the LDC to remain aware of these port needs and to give them due regard in any positions taken by your country at subsequent LDC meetings.

You may wish to emphasize that ports are essentially "innocent third parties" with respect to the Annex I contamination that is of concern to the LDC. Ports do not produce or generate Annex I substances and have no control over their occurrance or accumulation in bottom sediment. Ports are, thus, not in a position to control this pollution at its source, which would be the most effective way of handling the problem. This is a matter to be addressed by each country's national authorities. In the meantime, ports should not be penalized unnecessarily for contamination for which they are not responsible.

The IAPH, and its Dredging Task Force chaired by Herbert R. Haar, Jr., of the United States, remains available to assist you in explaining these and other port concerns to your national authorities.

Yours very truly,

Hajime Sato
Secretary General
of IAPH

Herbert R. Haar, Jr.
Chairman, Dredging Task Force
of IAPH
(Assistant Executive Port
Director, Port of New Orleans)

Contributions continue to come in for the Public Affairs Committee survey

In response to Chairman Wilson's recent appeal for IAPH members for voluntary contributions to his Committee's attitude survey, the following members have already sent in their contributions.

The targeted amount, set by the Committee, is US$35,000, in addition to US$15,000 already agreed to with the three Australian ports, namely, Brisbane, Townsville and Newcastle. This larger proportion of the total amount, was agreed to, as it was considered that these ports would gain the most from the pilot study, which will be conducted at these respective ports.

Those members who have not yet contributed to the survey, are urged to do as quickly as possible.

List of Contributors. (As received by Tokyo Head Office)	Amount in US$
Bundaberg Harbour Board (Australia)	350
Belfast Harbour Commissioners (U.K.)	350
Department of Harbours and Marine (Australia)	350
Port of Vancouver (Canada)	500
Gladstone Harbour Board (Australia)	350
Fraser River Harbour Commission (Canada)	350
Kelang Port Authority (Malaysia)	350
British Transport Docks Board (U.K.)	350
Port of Saint John, N.B. (Canada)	350
Port of Melbourne Authority (Australia)	1,000
Papua New Guinea Harbours Board (Papua New Guinea)	350
Port of Launceston Authority (Australia)	350
Port of London Authority (U.K.)	350
Port of Copenhagen Authority (Denmark)	350
Cairns Port Authority (Australia)	350
Port of Aalborg Authority (Denmark)	350

Port of Oakland (U.S.A.)		US$350
The Port of Singapore Authority	(Singapore)	350
Port of Gothenburg (Sweden)		350
Palembang Port Administration	(Indonesia)	350
Port of Rotterdam	(Netherlands)	350
Nanaimo Harbour Commission	(Canada)	CAN$500
Ports Authority of Fiji	(Fiji)	US$350

(as of September 7, 1982)

IMO Ad Hoc Scientific Group on Dumping will meet in Paris

The 6th Meeting of the Ad Hoc Scientific Group on Dumping will meet in Paris from September 27 to October 1, 1982. For the consideration of the meeting, Mr. H.R. Haar, Jr., Chairman of IAPH Dredging Task Force, submitted an updating paper on the "Special Care Measures for Safe Disposal of Polluted Dredged Material in the Marine Environment" which had been submitted to the 5th meeting of the Group in Halifax May 1981. (IMO Document: LDC/SG.6/3, 21 July 1982)

An executive summary of the paper is reproduced on page 31 of this volume.

IALA/IAPH/PIANC Joint Meeting in Paris, June 1982

Mr. J. Dubois, General Manager of Port of Le Havre Authority, in his August 6, 1982 communication to this office, reported that a joint meeting was held at IALA Headquarters in Paris on June 21, 1982, to discuss "New Port Traffic Signals". The meeting was attended by:—

Mr. H. Vandervelden, Secretary-General of PIANC
Mr. J. Prunieras, Secretary-General of IALA
Mr. B. Coloby, Representative of IAPH
Cdr. S. Ording, Chairman of the Joint IALA/IAPH/PIANC Committee on Port Signals
Mr. J.F. Levy, French Ministry of the Sea
Mr. N.F. Matthews, IALA Secretariat
Mme. C. Ville, IALA Secretariat

Ship/Shore Safety Check List Guidelines

During June-July this year, the above titled publication was sent to all IAPH members by British Ports Association. The publication, recommending that the check list should be used as widely as possible in order to set a uniform international standard of safety in ports throughout the world, was jointly issued by

The International Chamber of Shipping
The International Association of Ports and Harbors
The Oil Companies International Marine Forum
The International Association of Independent Tanker Owners
The European Council of Chemical Industries
The Society of International Gas Tanker and Terminal Operators

It is stated that the recommendations incorporate a ship/shore safety check list covering the handling of liquid bulk dangerous substances, including liquified gases, and that in order to further assist ships' personnel and terminal operators, guidelines on the use of the check list have been produced.

According to a recent communication from Mr. A.J. Smith, our Liaison Officer with IMCO, copies of the publication will be available to any interested parties by writing to:—

Mr. A.J. Smith, Secretary
British Ports Association
Commonwealth House, 1-19, New Oxford Street
London WC1A 1DZ, England

Two professors from Antwerp University present a paper from the Portech 82 seminars

Thanks to the kindness on the part of MarIntec, the organizer of the Portech 82 seminars, a paper written by two professors from Antwerp University, Dr. Robert Voorhamme and Dr. Willy Winkelmans and entitled "The Influence of Port Dues and Basic Infrastructures on Port Traffic" has been made available for publication in this issue.

The two professors are already familiar with IAPH, through their participation as speakers in the open symposium on community relations, firstly at the 11th Conference (Deauville, 1979) and then at the 12th Conference (Nagoya, 1981), in which they took part in their capacity as advisors on external affairs for the Rotterdam Municipal Port Management.

During the Portech Seminar, held in Singapore in June of this year, the paper was presented by Dr. Winkelmans on the theme "Finance and Economics".

IAPH news becomes available in Spanish

Following the publication of the Japanese version of "Ports and Harbors" from the January-February issue, the IAPH Foundation decided to translate the articles appearing in the "IAPH news and announcements" section for the members in the Spanish and Portuguese-speaking countries. The first issue of the translated news and announcements accompanied by the Secretary General's message in a 5-page leaflet was sent to the members as well as the relevant organizations from the Tokyo Head Office together with the original September issue.

The sponsor of the venture, the IAPH Foundation, in response to the long held wishes of the IAPH officers and the Head Office Secretariat, had been contemplating possible assistance in this area and was finally encouraged to start the service, by the success of the Japanese edition.

Some members may wonder why Japanese and Spanish only and not other languages. An answer to this question can be found in the fact that the Association has its members in more than 70 countries and it is simply impossible to make available the Association's publications in each different language, no matter how much the Association is blessed with the indispensable support of the IAPH Foundation.

In the past years each country has strived to solve the language problems through its own endeavors, as seen in the case of Japan, France and Korea, where each national association of ports or major port authorities has tried to make the IAPH conference papers and other important information available in its own language.

It is sincerely hoped by the Association and the Foundation that the Spanish version of the news will increase communication and understanding among the members and even future members of the Association in the regions

concerned, enabling them to better understand IAPH activities and to participate in them.

UN Secretary-General in Tokyo

Mr. Perez de Cuellar, Secretary-General of the United Nations, visited Japan from 23 to 28 August, 1982, on his first trip to this part of the world after his taking office. Dr. Hajime Sato, IAPH Secretary-General, in expressing IAPH respects and appreciation for the aims and objectives of the United Nations, delivered the following message to him through the Ministry of Foreign Affairs.

Dear Sir:

May I take this opportunity to express to you my warmest greetings on your visit to Japan, on behalf of the membership of the Association.

I understand that your visit to this ocuntry will deal primarily with those important issues that concern the world, and will not necessarily relate to port and maritime issues. I also understand that your schedule will be fully taken up with many appointments. I would, there-fore, like to convey to you, by letter, our feelings of respect and appreciation for the aims and objectives of the United Nations as well as the Association's ever felt admiration and gratitude towards the various specialized UN agencies with whom we have contact. These agencies, with whom the Association enjoys a consultative status as a non-governmental organization, include the Economic and Social Council (ECOSOC), U.N. Conference on Trade and Development (UNCTAD) and the International Maritime Organization (IMO).

It is my sincere hope that your visit will be fruitful and that you will enjoy the hospitality of Japan.

With my best regards,

Yours very respectfully,

Hajime Sato
Secretary-General

Visitor

Mr. Michael Hoy, Superintendent of Hunterston Coal Terminal of Clyde Port Authority, a Churchill Fellowship 1982, visited Japan to study the coal terminal operations in this country during the period from July 21 to August 12, 1982.

During his three weeks stay, he visited the following coal terminals of steel mills and commercial ports and thermal power station:—

- The Kimitsu Works of Nippon Steel Corporation, Chiba Pref.
  The Kashima Works of Sumitomo Metal Industries Co., Ltd., Ibaragi Pref.
- The Ohgishima Works of Nippon Kokan K.K., Kanagawa Pref.
- Port of Nagoya, Aichi Prefecture
- Port of Kobe and the Port Island, Hyogo Prefecture
- N.K. Coal Center and the Fukuyama Works of Nippon Kokan K.K., Hiroshima Pref.
- The Yahata Works of Nippon Steel Corporation, Fukuoka Prefecture, Mitsui-Nishi Nihon Ore Terminal, Fukuoka Prefecture
- Port of Hakata, Fukuoka City
- Port of Nagasaki, Nagasaki Prefecture
  The Koyagi Works of Mitsubishi Heavy Industries Co., Ltd., Nagasaki Pref.
  The Matsushima Power Station of Japan Electric Resources Development Co., Ltd., Nagasaki Prefecture

●: IAPH members, regular or associate

In Tokyo on July 29, he was invited to a regular meeting on coal transportation equipment of the Japan Cargo Handling Mechanization Association and presented the situation at Hunterston as well as exchanging views and comments with the experts present.

He was escorted during the whole course of his study trip by Mr. R. Kondoh of IAPH Head Office, being supported by the IAPH Foundation funds.

Membership Notes

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Associate Members

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Mr. Horacio Enrique Salerno (Class D)
(Assistant Professor, Catholic University of Argentina)
La Pampa 3221, (1428) Buenos Aires, Argentina
Phone: 552-7453

Change

The Cairns Harbour Board has changed its name to Cairns Port Authority according to the letter from Secretary of the Port Authority dated August 5, 1982.

A new logo for the Port of Kitakyushu

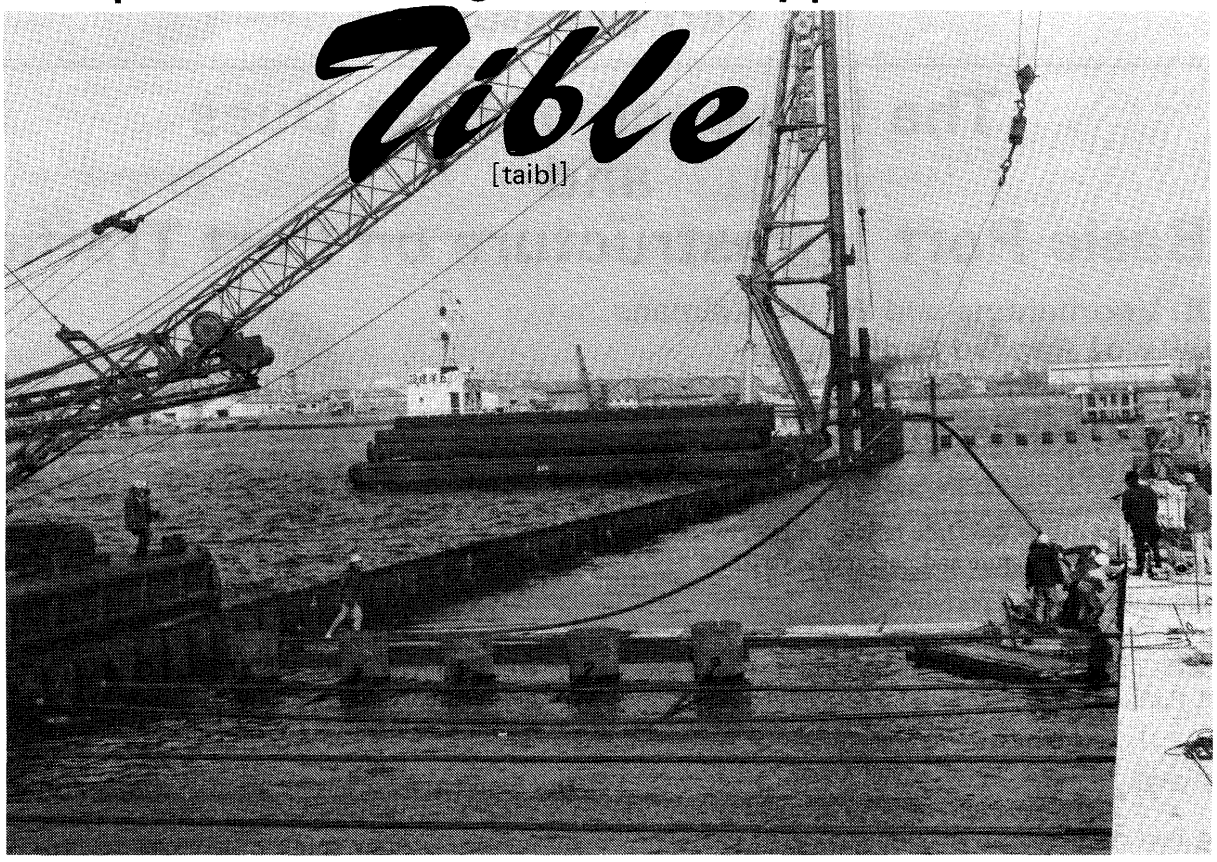
PORT OF
KITAKYUSHU

The Port of Kitakyushu, Japan, recently put on display its new logo which was chosen from 1,250 entries received in a nationwide competition.

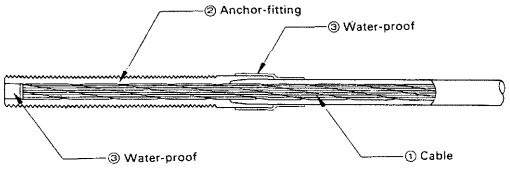
The winning entry, designed by Mr. Masahiro Kurachi, and showing the letter "P" spiralling from a global background, represents the ever increasing growth of the port, internationally.

The port of Kitakyushu, located in the north of Kyushu Island, across from the main island of Honshu, has long flourished as West Japan's largest international port. In recent years, the port's importance has been furthered by the relationship and bearing it has over the economy and lives of the people in the area. The city of Kitakyushu plans to use the new logo in promoting port activities and fostering closer ties with the port communities and the world at large.

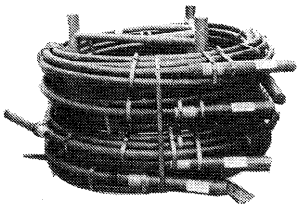
Epoch-Making New Type Tie-Rod



Structure of TIBLE



Transportation form



Advantages:

1. No need of turn-buckles nor ring-joints
2. No need of temporary supports
3. No need of assembling work
4. Simple scaffolding
5. Perfect anti-corrosion
6. Easy handling
7. Easy transportation
8. Lower price than Tie-Rod

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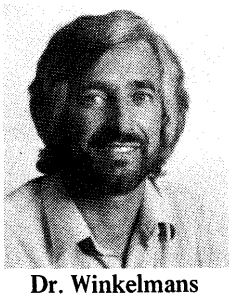
Open forum:
Port releases:

The Influence of Port Dues and Basic Port Infrastructure on Port Traffic

By R. Voorhamme and W. Winkelmans
Faculty of Applied Economics
State University Centre
Antwerp University

Contents

(Head Office secretariat: (*) The Chapter Three has been omitted for reason of space limitation.)



Dr. Winkelmans

1. DELIMITATION OF THE ISSUE of relationships between port dues, port infrastructure and port traffic variables

This report aims to analyse possible relations between the supply of basic port infrastructure and the economic price for it – measured by port dues levels on one hand, and the structure and size of port traffic on the other.
Although these three port "items" are of crucial importance to good port management, their underlying relationships are not very well known.
A number of reasons may explain this lack of information, a viz:

- many variables are in fact difficult to quantify;
- high degree of redundancy between traffic and infrastructure variables;
- high degree of inter-dependancy;
- low degree of harmonisation between applied statistical observation and charging systems.

Consequently together with problems of collecting the right and relevant data, one continuously has to face problems of multivariate analysis.

1.1. As to the first problem we try to give it a more concrete form by confining ourselves to ten European North Sea ports, all situated in member countries of the E.C. (European Community), but showing large variation with regard to size, administration and function (see also chart IV. 2). The ports are:

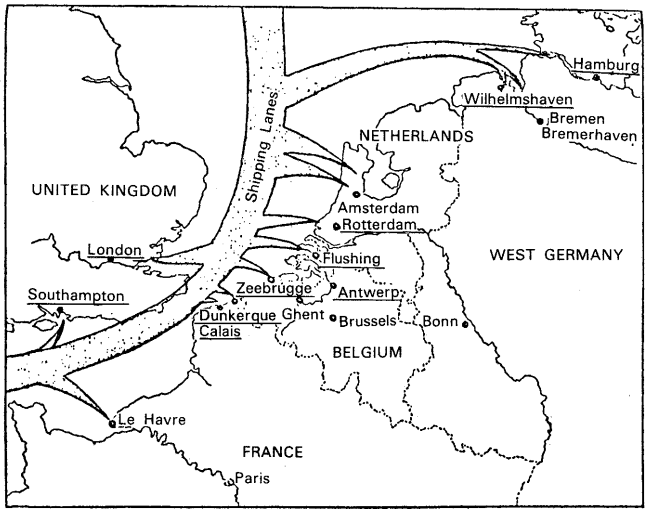
1. Port of Southampton (U.K.) a nationalised port (member of the B.T.D.B.) and highly specialised in containers.
2. Port of London Authority (U.K.) a typical polyvalent port and representative of public trust ports.
3. Port of Calais (France) a small "non-autonomous" port, specialised in short route (cross Channel) passenger traffic.
4. Port of Dunkerque (France) a rather polyvalent

"port autonome" and direct competitor of Belgian sea ports.

5. Port of Zeebrugge (Belgium) a semi-nationalised port, highly specialised in containers and RoRo.
6. Port of Antwerp (Belgim) a real multipurpose port and directed by the municipality.
7. Port of Vlissingen (Netherlands) a rather small port authority, called "Havenschap", where municipality, province and central government co-operate.
8. Port of Rotterdam (Netherlands) again a real multipurpose port, and the world's number one port.
9. Port of Wilhelmshaven (F.R.G.) a fairly small, specialised port for crude and minerals, privately managed, since we consider only the outer port.
10. Port of Hamburg (F.R.G.) another polyvalent world port falling this time under the authority of the country "Freie und Hanse Stadt Hamburg".

Membership of the E.C. was taken as a selection criterion, because since 1972 it has been decided that (cfr. Seefeld-report) various ports should try to cover all of their expenses by their own receipts in order to establish a common seaport policy and to come to an optimal distribution of traffic in the community(1).
So, motivation for the study is found in the increasing importance of a renewed trend, which decides in favour of cost recovering principles in port pricing policy, and the impediments, which prevent port authorities from putting such a policy into practice, viz. the fear of potential traffic shifts.

Chart IV.2: Location of the ten seaports investigated (underlined names)



1.2. As to the second problem, it must be stressed immediately that multiple regression techniques are excluded:

(a) for reasons of extremely high multi-collinearity;
(b) seen the arbitrary character of dependent and independent or explanatory variables. Indeed, what is to be explained first? Port dues by port capacity and port traffic, or port traffic by port dues, etc.?
(c) seen the heterogenous character of many of the "observed" variables. For all these reasons we preferred to use research methodologies in which distinction between exogenous and endogenous variables need not be made, and in which the increasing number of variables did not necessarily lead to an increase in the dimension of the real vector space to be explained.

(1) BIRD, J.: Seaport and seaport terminals. London, 1971, p. 11.

1.3. First step in the analysis procedure was the establishment of an overall price level index for port dues. A representative sample of vessels for each port, to serve as a basis for calculating the index, had to be composed by means of a classification technique which is new in transport economics. Indeed, after regrouping the population of the port's ship traffic into four major vessel type categories, five hierarchical cluster techniques were carried out on each of these populations. The clustering is based upon four determining port charging variables.
The significance of this method goes far beyond the specific purpose which is served here. Probably a very important application lies in the possibility of proceeding to surveyable analysis of ships structure of traffic, which is closely related to the problem of adapting the infrastructure capacity of the port and evaluate its utilisation.

1.4. The following step consists of reducing 66 traffic variables to a few main traffic "characteristics" or traffic factors. The best statistical tool in this context is without doubt principal component analysis or/and factor analysis, which are both "space reducing" techniques. Several factoring and rotation methods were tried out: principal factoring without and with interaction, Roa's canonical factoring, alpha factoring, image factoring and on the other hand quartimax, varimax, equimax and oblique rotation.

1.5. The last step involves factorisation of the correlation between the results of cluster analysis, principal components analysis and general data about port infrastructure characteristics.
The ultimate purpose being detection of possible relationships between official charging of port authorities and port traffic.

2. COMPARATIVE STUDY OF PORT DUES

2.1. Introduction

In general two criteria are used when classifying port charges. The first takes into account the nature of the underlying port service, which leads to a distinction between general and specific port charges. The second distinguishes between charges on ship and charges on cargo, depending on who is paying the charges – the shipper or the shipowner.
A combination of the two gives the following (inexhaustive) classification scheme:

A. General port dues (1)
   1. charges on ship: – conservancy dues
      – docking charges
   2. charges on cargo: – wharfage charges

B. Specific port charges
   1. charges on ship: – pilotage dues
      – towage dues
      – berth occupancy dues
   2. charges on cargo: – stevedoring charges
      – shorehandling charges (storage and/or warehousing)

The aim of the study is to compare the structure and especially the level of general port dues.

(1) Note that several names for the same conception are in use all over the world. For docking charge one may also come across harbour due, port-utilisation due, wharf due or anchorage.
Instead of wharfage charge, often tonnage due is used. We are thus confining ourselves to part A of this schme notwithstanding its restrictive nature for port dues represent only a minor part of the total port user cost (PUC) (1).
But, although port dues on their own are not representing the main item of the P.U.C. – the highest charges are to be found either in the mostly private tariffs on cargo handling, or in the capital and/or time cost.

(2) Marginally seen however – and most shipowners think in terms of marginal costs – these port dues might well be one of the decisive factors. Especially for liners and conferences the fixed basic costs are quite equal for various range ports, which implies that variations in port dues may influence the port selection by the shipowner for integrated transports and CIF-deliveries.
Furthermore, it is essential not to mix up totally different elements with differing character. Management of basic port infrastructure (access, locks, docks, quays, landsite, etc.) and of general port services (navigational aids, information centres, fire protection, etc.), can be regraded as a separate field.

(1) Port user cost is the sum of all costs with respect to the ship and the cargo to be loaded or discharged; from the moment of arrival to that of departure from the seaport in its broadest sense.

(2) According to UNCTAD the total cost of e.g. a 10,000 tdw sea going vessel for a haulage of about 3,000 n.m. would approximate 25 $/t comprising
- 40% port time costs
- 7% port dues (including towage and pilotage)
- 13% stevedoring costs
- 40% cargo handling costs on quay

A more detailed research by CERLIC (France) demonstrates that port dues only vary between 2 and 7% of the P.U.C. at least for general cargo. For bulk ships, and especially for liquid bulk ships, their relative importance may increase up to 31%, mainly because then time and cargo handling costs are relatively less important. Of course the nautical situation also plays a role, which is showed by the comparison between

P.A.M.	<	P.A.D.	<	P.A.R.
(open sea)		(locks)		(locks + access channel)

in port management. This means that it is perfectly comparable between all ports (at least if one does exclude the maritime access) and, what is more, it does belong in almost all cases to the competence of official port authorities (whether belonging to central or local government administration).
Last but not least it is worthwhile to remark, that the official character of port dues makes it relatively easy to measure them in a general and comparable way, which is from a scientific point of view of paramount importance. Most of the specific port charges, on the contrary, are so differing in administrative and geographical nature or, even worse, are rather unmeasurable due to unofficial price reductions and dumping practices.
The fact of restraining ourselves to the official port dues seems to be therefore a strength more than a weakness.

2.2. Cost-based port dues

The issue of cost-based tariff calculation is fundamental, because port dues in general are the main source of income of port authorities.
Two phenomena are still intervening with the tendency towards cost-based charging:

a) the fear of traffic diversions by price-competition;
b) the existence of an over-capacity in many ports, which makes it unjustified to impose real costs on the port users only.

In the meanwhile several studies about port economies increasingly promote the cost recovering principle as the only sound economic basis for charging in the future.
Furthermore, the large relative weight of port tariffs in port economics and their rather small relative weight in the economics of shipping, could serve as an incentive to try to restore one and another in favour of the public interest.
Therefore, a review actual port dues – structure and level – ought to be drawn up, in order to get a clear idea of the weight and nature of possible adjustments which would involve an introduction of cost related prices.
Most port authorities occasionally make some calculations in order to compare their own rates with those of their immediate competitors.
On the other side a number of national and international organisations did more than once try to provide a general survey of the actual tariff structures and levels in a number of ports. The results however were always disputable or incomplete.
Ports rates indeed have become very complex and as such difficult to generalise. The resulting dissimilarity in structure and measures (GRT, NRT, BNT, liner concept, loading degree, etc.) makes it hard to set up a fair and reasonable comparison between ports.
The major difficulty however lies in the fact that any comparison between bare tariff structures is rather senseless if it is not accompanied by a calculation of the resulting price level. Precisely this link never has been worked out in a satisfactory way.
In fact the calculated port dues were valid for only a limited number of arbitrary chosen ships, and therefore not necessarily representative to any sea port.
This method may lead to significant results, when applied in case studies, viz. per ship or per line. It cannot possibly teach us much about the "dearness" or the "price" of a port with respect for instance to tankers, containerships or any other general category of vessels.
Therefore the choice and compositon of a representative sample of ships is of paramount importance. Our aim is to establish a method which permits collation of representative samples of ships as a function of port tariff structures.

2.3. Port charging systems

2.31. Parameters as a basis for charging

Although cargo is the ultimate beneficiary of the transport contract, port dues are mostly partially or sometimes not at all, charged against cargo, precisely because from the point of view of port management, ship's size and characteristics (independently of what kind of goods it may be carrying) are extremely important with respect to the infrastructure costs.
In general, port dues include three categories of charges: (1) conservancy charges, (2) docking charges and (3) wharfage charges. In most ports however these categories do not appear as such in the tariff structure. Rather, they are incorporated in a single – though rather complex-charge.
Conservancy dues should cover the cost of providing and maintaining approach channels, breakwaters and other general maritime infrastructures of the port.
Since these costs are more or less proportionate to the phy-

sical size of the vessels entering the port, a widely accepted charging measure at this moment is the Gross Register Tonnage (G.R.T.) of the vessel. The GRT indeed is a reliable index of the vessel size in terms of the space, which is to be provided by the port in view of all three dimensions–length, beam and draft.

A major problem for many ports, since the last two decades, are those costs which were and still are to be made in order to make the port accessible to very large carriers with deep draft. In order to prevent smaller ships from bearing these "additional" costs too, two remedies seem plausible. Firstly, the institution of a supplementary due for large ships, so-called jumbo surcharges; or secondly a direct participation in supplementary costs, of every user within the category.

Dockage or berthing dues are charged for the occupation and use of a berth, and should cover the costs of providing docks, quaywalls and a proportion of shoreside facilities.

Once more the obvious measure seems to be the G.R.T. or the N.R.T.. But in this case the Length Over All (LOA) measure is more accurate with respect to smaller vessels (see above), which require proportionately at least as much quay length as the larger ones. Incorporation of L.O.A. as a charging basis is a rather recent trend (mid-1960s) and has until now only been applied in the U.S. Gulf ports.

Tow further important determinants in terms of a dockage rate are the time factor and the vessel type.

In contrast to American port rates, where in most cases a time factor is directly built in the tariff structure (e.g. $US per G.R.T. per time unit of 24 hours), it is glaring to see how little attention is paid to this matter in European ports, where it is more a practice to impose a surcharge after an initial period of at least two weeks (sometimes even two months).

A containership staying only 12 hours at the quay often has to pay as much on port dues as a conventional cargo carrier staying for more than a week.

As ships become larger there are no doubt economies of scale at sea. In the port, however, much depends upon typical port activities such as loading and discharging, storage and warehousing. In other words, at the end it is total turnround time of the ship, i.e. including the various port rotation times, which will determine the cost price of maritime transportation (1).

In a very elaborate study concerning "Maritime Freight Rates" one came to a most interesting conclusion in this respect.

Indeed, several regression models tested have proved that a significant relationship do exist between port cost – i.e. port dues and charges, expenditure other than the cost of loading and unloading – and freight rates per ton for many commodities. The relationship however was the inverse of what could be expected normally, viz. freight rates per ton for a specific commodity on different routes would be highest on those routes with the highest port cost.

The most reasonable explanation for this unexpected investigation result is the assumption that the most expensive ports are also those which operate most rapidly. The time spent by vessels in port was indeed included in the port cost variable (U.N., E.C.L.A., pp. 169/70).

(1) It is obvious that the cost price decrease of bigger sea going vessels will only maintain if the relation between voyage and port times remains favourable.
This reasoning is quite relevant to our study, because port dues, quay dues, etc. should vary with the quality of port services offered, amongst which the cycle time is not the least important.

In the frame work of port economics the main argument to promote a time-related tariff rate is that it would fight against inefficient usage of port facilities.

As a matter of fact vessel types remain one of the most predominant operation factors, because they influence quite directly both shipping and port economics. Construction costs of a maritime terminal and turnround time of vessels are indeed directly related to the main vessel types. Tankers and dry bulk carriers for instance pose specific problems with regard to draft, storage and discharging facilities; often also sites for related industries, or in the case of ore and coal carriers, specialised transshipment infrastructure, like waterways and canals for lighters and pusher combinations, railway facilities, etc. are needed. Unitised cargo carriers on their side require terminals with a very high surface/quay length ratio, easy or fast access possibilities, paving related to the use of much heavier equipment (container bridges, straddle carriers, etc.). The importance of the vessel type factor should not be underestimated.

Wharfage dues are charged for the use of port infrastructure on the landward side (mainly storage facilities). In general they are assessed against the merchandise, based upon three possible parameters:

(a) the value of the goods;
(b) the phsysical characteristics of the goods and
(c) the origin and destination of the goods.

In this way actual tariff structures show a differentiation according to the NSTR categories of goods and/or the number of metric tons loaded or discharge and/or whether it concerns national coastwise, international coastwise or transoceanic transport (although this is more meant as a competition measure).

Finally practically every port authority has incorporated a number of reductions in its regular tariff structure. These reductions are in the first place intended as stimulators for a higher port usage by vessels and ensure capacity utilisation. They also contribute to the competitive position of the port. Apart from reductions to vessels in ballast, war ships, vessels which enter for repairs, etc., they mainly concern liner traffic, vessels with a high frequency of calls and also partially loaded vessels or ships which either load or discharge, although in practice this does not always lead to a greater port productivity.

2.32. Remarks concerning charging systems in Europe

1. Tariff structures seem to be fairly similar within each country but the opposite is true between different countries.
2. Many structures are out-dated. They contain too many exceptions, use out-dated measures such as the NRT, make distinction between origins or destinations, which is irrelevant to the basic problem.
3. Most structures are far too complex in order to make relevant comparisons. This is especially true for the English, German and French sea ports.
4. In general national policy plays a greater role in determining the port tariff structure then real economic situations.
5. As managerial instrument port dues nowadys are failing in most cases. Port due levels indeed neither reflect real cost price levels nor do they reflect eventual and/or local efficiencies of the charging sea port. Moreover, such seems to be the wish of many port authorities!

2.33. Remarks concerning the efficiency of the applied systems

An answer should be found on the question whether it is really worthwhile to complicate port charging matters as they are nowadys. A uniform structure seems quite feasible indeed. Most sea ports surveyed seem to be interested in a standardised approach to port pricing, or in other words in some form of uniform (cost based?) pricing formula, provided competitive relationships are not jeopardized (1).
The trend to become self-supporting is also reinforced by growing difficulties in the implementation process of port expansion programmes. The fact that a certain financial autonomy might ameliorate their position encourages many port authorities to place greater emphasis on developing a rate basis which is reasonably related to costs. In most ports this shall no doubt cause increases in tariffs, but combined with the knowledge that port charges may not be a significant factor in port selection by shippers, these price ameliorations could be initiated with minor, if any, adverse effects.
According to the American Association of Port Authorities (A.A.P.A.), a standard approach to port pricing would even greatly help in this case through increasing stability of rates among ports, by facilitating port comparisons and last but not least by improving user.

(1) In the U.S.A. one and another seems to run parallel with a certain trend to self-sufficiency too. Understanding of the port cost-rate relationships and so of eventual need for rate adjustments.

Another important feature of port management in this context consists of the fact that according to the evolution of selected revenue and expenditure items in a range of world ports no obvious correlation seems to exist between on the side, those items and on the other, traffic levels measured by tonnage handled.
As a consequence, net revenues from dues, etc. are not always proportional to port throughputs, which implies that increases in traffic do not always automatically lead to substantial improvements in port productivity, also because corresponding port expenditures too are rather uncorrelated. In no small measure this is due to the indivisibility of most port facilities, but to an even greater extent this may be due to the unreliability of port traffic forecasts and/or the inflexible price of the demand.

2.4. Port charging levels and the methodology to compare

2.41. Feasibility of relevant comparisons

As already noted, any comparison between the existing port tariff structures is extremely complex and finally inefficacious if one cannot make the link to the resulting level of charges. For that purpose we need an overall price level index for port dues, which would allow to make a cross-sectional price level comparison.
Two major difficulties are encountered when establishing such an index.
From a theoretical point of view much of the accuracy of such an index depends on the choice of its composing elements. In this respect the sample of vessels which will serve as a basis for calculating the index is of crucial importance, because it must reflect the complete actual sea traffic structure of the ports concerned.
From a pure practical point of view it is furthermore impossible to gather complete data for all port tariffication parameters. For not all of these parameters are quantifiable (such as membership of a line) and, what is more, often are not at hand in the right measure, due to deficient port statistics with respect to the ship structure of port traffic. Indeed, actual port statistics primarily concern arrival figures rather than vessel figures. In addition they are principally concentrated on the commodity structure of the port.
The composition of the world cargo fleet hardly can be regarded as representative for the ship structure of Western European ports. To obviate these problems, a three-step procedure has been established:

(1) Consider only those ships which utilise the ports concerned as the basic population.
(2) Split up this population by port according to the different vessel types.
(3) Classify the vessels within each of these split up groups according to the port tariffication parameters of the ship (or more generally according to the criteria parameters).

Until recently it was impossible to execute even the first step of this procedure, simply because no publications existed which would have allowed an operational quantitative approach. Since 1977 however Lloyd's of London Press established a new system to record and process via computer the information contained in the three shipping publications: Lloyd's List, Lloyd's Shipping Index and Lloyd's Voyage Record. One of the main files – the Vessel History file – contains the names and particulars of about 32,000 vessels – which is practically the whole world cargo fleet – and the recorded movements of these vessels over a calendar year period.
From this file it is possible to supply tapes of recorded vessel movements. – Vessel Movement Tapes (V.M.T.) – in whatever manner the analyst requires. In appendix 1 the field description of a record is given.
The great advantage of this source of information is that it provides the complete ship movement structure of any of the required ports. In other words it gives an answer on matters like how many ships called at the port (which is clearly different from the number of arrivals, found back in the statistics of every port authority); what type of ships these were; how many times each ship called at the port; how long it stayed at the port; where ships were coming and sailing to; etc. Consequently these data are perfectly suited for the purpose of composing a representative sample of ships and their characteristics, for they are based on the actual ship structure of traffic in each port desired.

According to the Lloyd's classification, one can draw a distinction between 23 principal vessel types, including all sorts of fishing and passenger vessels, but also tugs, dredgers, ice breaker, research ships, etc. Only 12 types of cargo vessels are to be taken into consideration, viz. oil tankers, liquefied gas carriers, chemical tankers, bulk-oil carriers, ore and bulk carriers, general cargo ships, miscellaneous cargo ships, container ships, lighter carriers, vehicle carriers, RoRo ferry and livestock carriers. Keeping in mind that the ship's size or any other related variable, such as ship's length, beam or draft, mainly should be linked to the nature of cargo to be shipped, rather than to be considered as a given independent variable. Indeed, technical and economic properties determine the packaging of cargo, which in its turn is the most decisive element for the construction size and lay-out of the vessel, and consequently of

the port capacity also.
One can easily regroup these twelve types into four separate classes:

1. liquid bulk carriers (tankers)
2. dry bulk carriers (bulk)
3. unitised cargo (principally container but also RoRo vessels)
4. conventional cargo vessels (general cargo vessels)

For the information on the V.M.T. this means a regrouping of twelve ship types as follows:

group 1: Tanker: tank, gastank, ore/oil, bulk/oil
group 2: Bulk: bulk, ore
group 3: Unitized cargo: container, RoRo cargo
group 4: General cargo

Excluded are RoRo ferry, livestock and ferry.
It must be said that for a number of port charging parameters, data per ship, can directly or indirectly be recovered from the V.M.T.: Gross Register Tonnage, frequency of calling, origin and destination, time in port and type of ship. For another number of port charging parameters it is difficult to find the exact data.
A difficulty to which everyone who wants to compare port dues of different ports is confronted is the difference in standard measures.
As to the conversion of GRT to NRT a fairly good approximation is given by B. Wilson and T. Hunter of the National Ports Council. They found that a very high correlation between NRT and GRT exists for all types of sea going vessels.
The following ratios (GRT/NRT) were calculated (with R^2 of 0.96 to 0.98):

tankers	: 1.5678
bulk carriers	: 1.5614
container vessels	: 1.7020
general cargo vessels	: 1.7460

taking the inverse gives us:

tankers	: 0.638
bulk carriers	: 0.640
container vessels	: 0.588
general cargo vessels	: 0.573

The loading degree of cargo manipulated in the port is often very important for the level of the port dues too.
However, practically no systematic relation of this sort of degree with respect to one of the size measures of the ship can be found on a general basis. It only may be accepted that bulk vessels have a higher degree than conventional vessels, and liners often show the smallest degree.
Nonetheless it seems preferable not to handle with only one loading per ship, but on the contrary to calculate each time the charge level for several loading degrees. The net deadweight tonnage figure can serve then as a basis. Knowing that this is the expression of the net loading capacity of the vessel the following percentage figures of net dwt seems plausible:

tankers and bulkers	: 100, 75, 50, 25
containerships	: 150, 125, 100, 75
general cargo vessels	: 150, 100, 75, 50

Here, we bear in mind that general cargo and container vessels mostly both load and discharge while tankers and bulk carriers often only discharge, and also that container vessels necessarily work at a higher productivity rate than general cargo vessels.
Another major difficulty is the different acceptation which exists of the word "lines", or in other words: when is a vessel considered to be in a liner service?
Closely related to this problem is the tariff reduction for high frequency of calls.
Sometimes it is a question of sailing schedule and a minimum of regular sailings (Rotterdam); it is more a question of frequency and a minimum number of sailings of the vessel (Antwerp) or of the line or company (Zeebrugge).
Since the information on Lloyd's tapes merely contains data about the frequency of sailing of the ship, we made the assumption in the case of Hamburg, Rotterdam, Flushing, Zeebrugge, Dunkirk and Calais, that a ship sails in liner service only when it is classified as container or general cargo and sailing at least six times a year.
Furthermore in order to take into account the fact that the frequency of sailing of a line is generally higher than that of any particular ship within the line we assumed the frequency of a line is at least twice that of any ship within the line.

2.42. Classification of vessels according to types and sizes: a clusteranalysis approach

Instead of calculating port dues for particular ships, a complete selection of the total ship traffic structure in ten ports was composed, out of the Lloyd's tapes of the year 1978. Each of these ten population was then split up for each of the four ship types (tanker, bulk, container and general cargo). Hence the problem confined itself to make each of these populations suitable for survey, or in other words to set up within each of these populations a classification of vessels according to the size and port due parameters.
Of course, the content of the movement records was reduced to identification and classification parameters.
The size of the vessel-population as a result ranged from a minimum of one ship (for the container category in Wilhelmshaven) to 5297 ships (for the general cargo category in Rotterdam).
This makes it necessary to reduce the data matrices, because the algorithm used in the computer programs with respect to the search for the most similar pair and subsequent updating of the similarity matrix requires for a maximum of 250 entities already has a total number of 123,875 comparisons for all steps(1). So the number of objects to cluster was limited to 250 maximum. This implied for a number of categories that a preliminary random sampling had to be carried out, to bring back the number of ships to 250.
As to relevant tariff variables the following elements could fairly easily be taken into considerations:
Gross Register Tonnage, deadweight tonnage, frequency of calls and origin of the ship. One of the main problems when searching for a proper measure of association among data units is the heterogeneity in variable types and measure.
In our case, the variables can be described as follows:

- GRT : continuous ratio-scale (quantitative)
- DWT : continuous ratio-scale (quantitative)
- Frequency : discrete ratio-scale (quantitative)
- Origin and destination: category variable which can be described as discrete nominal (qualitative).

(1) M.R. Anderberg found that for a total of n entities, the total number of comparisons to be carried out for all steps is $2n^2 - 9\frac{n}{2}$.

Theoretical background was further based upon the work of M.R. Anderberg, for which software and hardware were found at the University of Brussels Centre of Statistical and Operational Research. Obviously the difficulty results from the last variable for the intention was to convert all variables into interval variables.
The use of a reference interval variable may give the solution in this case: i.e. the tariff differences for the different regions. For example in London three zones could be distinguished with the following relations: 100 for the cheapest origin zone, then 311 and 467 for the most expensive zone.
Because of the possibility of working with interval scale characters, preference was given to distance coefficients to construct the similarity matrix.
The general distance function, which is the Minkowski metric can be written as follows:

$$d_r(j,k) = \left(\frac{1}{n}\sum_{i=1}^{n} \left| X_{ij} - X_{ik} \right|^r\right)^{1/r}$$

in which j and k are different objects

X_{ij} refers to the state of variable i for object j
n is the number of variables
r is a positive integer.

Three special cases of this general function are used. $d_1(j,k)$ which is also called the Manhattan or cityblock metric;

$d_1(j,k)/n$ or M.C.D. (Mean Character Difference); and
$d_2(j,k)$ which is the mostly used Euclidean distance or taxonomic distance.

In this case the Manhattan metric was preferred to the Euclidean distance it emphasises more on the specific characteristics of each variable.

$$d_1(j,k) = \sum_{i=1}^{4} \left| X_{ij} - X_{ik} \right|$$

Five different hierarchical clustering methods were then tested out on the population of tanker vessels in London. These are:

(1) The single linkage method
(2) The complete linkage method
(3) The average linkage within the new group method
(4) The average linkage between merged groups method
(5) The median method of Gower.

For reasons of good sense, clarify and final results the complete linkage method was preferred.
Starting from the clustering results of the 39 analyses (1), representative (theoretical) ships were defined by taking the mean of the values of each variable within each cluster. The results of these selection of "representatives" are shown in the tables in appendix V.2. By assigning a weight to each of these representatives in relation to the relative importance of the cluster concerned (number of objects in cluster/total number of objects which have been clustered), it became possible to calculate for each type of ship a price index (per GRT) based upon the actual ship traffic structure of each type for each port. The results of these price level index calculations are shown in the tables in appendix V.3.

2.43. Results and comments

a. Specific remarks with respect to the different ports

As to the category of tankers most ports receive many small tankers, often with high frequency, always sailing within the range. London, Southampton and Calais do not receive big tankers and consequently only serve within range traffic with moderate frequency of sailing. Wilhelmshaven on the contrary serves predominantly large and very large carriers, mostly from outside the North Sea range with a low frequency of sailing. In Antwerp and Hamburg many small tankers frequently call, having sailed from ports within the North Sea range. Also, a considerable number of medium/large tankers call from within this range. Flushing and Dunkirk serve tankers from all size categories mainly sailing from within range ports, with only a high frequency of sailing for the small category. The moderate tanker traffic in Zeebrugge consists of either very small or large tankers with a rather low frequency of sailing. Rotterdam is the predominant tanker port of Europe with an extensive traffic comprising all vessel categories sometimes sailing at a high frequency.
Regarding bulk traffic, only Rotterdam and Dunkirk (and to a lesser degree Hamburg) serve really large carriers. By far the majority of bulk traffic uses medium large ships. Except for Rotterdam and Dunkirk bulk ships utilise the same port mostly only once or twice. In all ports, the origin of sailing shows a great variation.
Container traffic consists of a wide diversity of ship sizes, except for Zeebrugge which receives generally large container carriers and Calais with only small carriers. Overall it can be stated that Rotterdam, Hamburg and Antwerp are the most important container ports within this range, while Wilhelmshaven does not have any container traffic at all.
General cargo ships calling at all these ports form a smaller proportion than the other categories. They are served in all ports and sailed on both short routes and transoceanic routes. The frequency of call seems to show a correlation with the size of the port, obviously due to the presence of a higher number of lines in the bigger ports.

b. Estimation of a port dues level index by kind of port and vessel type

By means of our cluster analysis results it becomes really feasible to estimate different port dues levels. Indeed, the tables in the appendix concerning "Port Dues Level Index" contain every component of public port tarriffication. Furthermore, it is worthwhile to repeat that representative vessels per sea port and per trade category are really representative for the ships entering the port considered. Therefore the first four columns of those tables in the appendix are extremely important as regards the shipping structure of the port and in view of the tariff application.
Indeed, they enable calculation for every representative vessel which resulted from the cluster analysis, the amount of port dues for different loading degrees in different years.
Once these different amounts of port dues for each representative of each ship type in each port are calculated, the estimation of a representative port dues level index is quite simple.
Indeed, the port dues level index D_{jk} for port j and vessel type k can be considered as:

$$D_{jk} = \sum_{i=1}^{n} w_{ijk} \frac{d_{ijk}}{g_{ijk}}$$

where :
- d_{ijk} is the amount (in U.S.$) of port dues which would have been paid for vessel representative i of vessel type k in port j;
- g_{ijk} is the corresponding gross registered tonnage of representative i of vessel type k in port j, which is used as a divider in order to make the port dues level indices comparable in time and between ports and types.
- w_{ijk} is the weight or relative importance of the representative; in the total group of representatives (jk) (see column 4 in tables of appendix 3) and respond to $0 < w_{ijk} \leqslant 1$;
- n is the number of representatives within each group (jk).

(1) Wilhelmshaven – container was not analysed because the whole population contained merely one ship.

The results of this calculation are to be regarded as the representative level of port dues per G.R.T. for a particular ship's type in a particular port and can be found in the last row of the tables in appendix 3.
In order to compare these results a synoptic table of indices has been drafted (cfr, table V2).
Index 100 is assigned to the P.L.A., because this port is assumed to apply cost-based port dues.
The minimum and maximum columns refer to the variations in degrees of loading of the ships entering the port.
A first comment regards the big variation in outcomes, as well as evolution:
The variation in tariff level between the sea ports for the same year is of the order of factor 7 to 14. The most expensive port for tankers and bulkers is Southampton followed closely by London.
Furthermore it must be remarked that the Benelux sea ports of Rotterdam, Flushing and Antwerp, do not show much variation, certainly not in 1980.
The variation coefficients indicate a great variation in price level for container and bulk traffic than for tankers and general cargo vessels. Nevertheless it is also remarkable that in all ports the price level compared to the PLA-reference level lowers itself most sharply for the container traffic.
The increase of port dues from 1978 to 1980 also varies rather considerably between different ports. Whereas Antwerp succeeded in achieving a small decrease, Dunkerque almost doubled its port dues. In general, the increase seems to be of the order of 25 to 40%. More importantly by means of these price increases the variation in levels between the ports is mutually augmented too (compare columns by columns resp. min. and max. situations). This may also imply that in some ports more or less structural changes have been incorporated, which was surely the case in the port of Antwerp.
Table V3 gives percentage figures concerning differences in pricing according to the loading degree.
In all ports this difference is smaller for container vessels, which is especially true for Dutch ports. In general, Zeebrugge and the French ports show a greater relative importance of the loading degree in their tariff structure.
It leads one to think further upon causes and consequences of such divergent results with reference to fairly comparable package of services offered, viz. protected water with basic port infrastructures.
In continental ports it appears that the dues for container ships are at a considerable lower level (25% to 30% lower in 1978 and even 29% to 33% lower in 1980) than those for any other ship type. Probably this is due to severe interport competition in this sector.
The fact that the container vessel category is the only one where the variation of the port dues level over the different ports does not increase from 1978 to 1980 (compare tables V4a and b) can be considered as a confirmation of this assumption.
Remarkable also is the little variation in level between the two British ports.
The variation of dues level over the vessel types differs from port to port.
In this respect the higher dues levels for tankers in Rotterdam and for bulk vessels in Dunkirk may be explained by the higher degree to which this traffic is tied to the port. Obviously Rotterdam is by far the most important European crude oil port and as such can even take the liberty of applying a surplus charge for oil tankers.
In Dunkirk, bulk traffic (mainly ore and coal) is for the greatest part linked to the national steel industry Usinor and electric power plants both situated within the port zone.
In general one might conclude that British ports are a lot more expensive than continental ports probably due to their cost recovery philosophy. Furthermore, ports within a small range show little variation in price levels, taken into account that smaller ports always price themselves at a lower level than bigger ports. Finally, container-traffic on the continent is priced at considerable lower levels than could be expected, compared to the other traffic.

4. FINAL COMMENTS AND CONCLUSION

The whole classification and variables reducing exercise in fine leads us to two quite different statements:

1. As regards the issue of estimating and comparing official port dues, cluster analysis on very divergent – in number and structure – vessel populations or samples per sea port given several relevant tariffication parameters proved to be not only perfectly feasible, but finally gave very satisfactory results, at least from a point of view of comparison.
2. As regards the issue of interrelationship between port dues and other port variables, principal components analyses on very large sets of variables reduced effectively and efficiently the number of relevant port variables.
   Seen the fact that the procedure went on in three steps – first traffic variables, next infrastructure variables and last port dues variables – the possibility to detect relations inter-group instead of intra-group could be maximised.

   A. After all it seems that the port dues component ("variable") – despite the fact that in most ports under study port dues are not cost-related – is still related to other port components ("variables") but ONLY in very specific situations. Indeed, in the frame work of the so-called non-specific port components port dues load fairly high on two final principal components:

   a. negatively on componet I', characterised by traffic componet 4 implying a high share of dry and neo bulk traffic and infrastructure component 3 implying a plain central position in the port range surveyed. Quite understandable therefore, Dunkerque scores very high on this port dues relevant component whereas London and Southampton score very low, although they all are rather "expensive" ports (1);

   b. Positively on component IV', characterised by traffic component 7 implying high turnround times for all ship's traffics except for tankers. Consequently Zeebrugge scores very low and London, Southampton and especially Dunkerque score very high on this second port dues relevant component. In other words, though rather surprising, the "slower" some ports are, the "higher" their port dues may be. This however, does not at all imply a causal relationship, it is merely a statement.

   In addition, it is worthwhile to remark that just Dunkerque scores rather high three on four times. This might imply that traffic component 4 – previ-

ously called to a certain degree of "Dunkerque type" (cf. p. 55) – is indeed so strongly related to one specific port, in this case Dunkerque, that it had to be excluded too in our final reduced principal components analysis.

(1) Do port dues in relation to dry bulk and neo bulk traffic really have so little importance, that they even seem to vary in the opposite sense w.r.t. some traffic and infrastructure elements!?

B. On the basis of all port components taken together the above reasoning remains affirmative. Of course, seen the fact that more "variables" then are interplaying, the relationships are somewhat less pronounced, but on the other hand the port dues component is also loading fairly high on component V, which is mainly characterised by traffic component 2, implying a high share of transoceanic unitised traffic. However the score of Southampton is so pronounced, that afterwards we preferred to exclude this traffic component from the experiment on reduced principal components. Nevertheless, again the outcome is quite logical: Southampton claims indeed relative high port dues, also for its container services.

So finally, all these statements and comments on it essentially are pointing out that the huge variation in and between port variables must not hide the specificity of every sea port, also w.r.t. port dues levels. And this may be something unawares(1).

For the moment the result of this study is not very operational, but such is plainly a matter of finding convenient statistical data for further research.

(1) Do not forget that on itself the variation in port dues in and between ports could be reproduced for 96% by means of the product of one component (1!) and 10 port component scores.

Appendix V.1.

Field Description of Record

Vessel Particulars

1. Vessel Name – field no – VM0030
   Current name of vessel.
2. Flag – field no – VM0050
   Current flag under which vessel operates.
   For complete list of flag abbreviations.
3. GRT – field no – VM0040
   Vessel Gross Tonnage
4. DWT – field no – VM0170
   Vessel Dead Weight Tonnage
5. Description – field no – VM0120
   Text describing type of vessel (e.g. tank, gas tank, bulk, etc.)
   For complete list of types.
6. Classification – field no – VM0140
   Text indicating the Classification Society of the vessel.
7. Year of Build – field no – VM0150
   Two character year indicating the year this vessel came into service.
8. Lloyd's Register No – field no – VM0200
   Lloyd's Register of Shipping's hull number.
   This number provides a link between Lloyd's of London Press's computer tapes and Lloyd's Register's own computer tape services.
   This number remains constant regardless of name changes to a vessel.
9. Lloyd's Vessel No – field no – VM0210
   Lloyd's of London Press own hull number.
   This number stays constant regardless of changes of name to a vessel.
10. Version No – field no – VM0160
    This number is incremented to every change of name that has occurred to this vessel.
    It commences at zero for when the vessel is first added to the Lloyd's of London Press history file.

Vessel Movement Information

1. Reporting Port – field no – VM0070
   Decode of name of port at which movement occurred.
   Corresponds to coded fields no VM0010 and VM0130.
2. Main Route Code – field no –VM0130
   Describes the main geographical area within which the reporting port is situated. (i.e. decode field no. VM0070.)
3. Port Sequence Code – field no –VM0010
   Code indicating relative geographical location of reporting port within main geographical area. (i.e. field no VM0130)
4. Status – field no –VM0060
   Code indicating the type of movement (i.e. an arrival or sailing or passing, etc.)
5. Date of Movement – fields VM0080 = Year
   " VM0090 = Month
   " VM0100 = Day
   " VM0110 = Date Qualifier
   See appendix 4.
6. Destination/Origin Port Qualifier – field no – VM0240
   Contains upper case text 'FROM' or 'FOR' indicating whether field no VM0250 is previous or next port of call.
7. Previous/Next Port – field no – VM0250
   Decoded port name of the previous or next port of call. Also contains date of arrival or sailing at this port.
8. Main Route Code – field no – VM0230
   Describes the main geographical area within which the previous or next port of call lies. (i.e. field VM0250)
9. Port Sequence Code – field no – VM0220
   Code indicating relative geographical location of previous/next port of call within main geographical area. (i.e. field VM0230)
10. Record No – field no – VM0020
    Record no. incremented within each vessel for each record written to the output tape.
    This enables the file to be re-sorted to its original sequence. Note that it is not possible to sort the file back into original sequence on the chronological dates of the movement because of the existance of blank dates. (i.e. it has been recorded that the vessel moved at a particular port but the data was unknown.)

Appendix V.3.
Estimation of Port Dues Level Indices

- Number of representatives: based upon the selected number of relevant clusters.
- FREQ. : frequency of call if appropriate,
- ORIGIN : if not
- RELATIVE IMPORTANCE: Calculated on the basis of the relative weight of each relevant cluster within the total number of objects to cluster
- PORT DUES : remark that the NRT and BNT were estimated resp. for the French ports, Southampton and Zeebrugge by means of conversion factors.

Table 14 Comparison between Present G.R.T. and Present N.R.T.

Type of Vessel	Nos of vessels	Regression Equation (Standard error of co-efficient)	R^2	Ratio of g.r.t. / n.r.t.	95% Confidence Limits of ratio
Tankers	38	g.r.t. = 1.2445 n.r.t. + 3778 (0.0270)	0.9834	1.5678	1.0629 to 2.2300
Ore carriers (a) Measured under British and similar rules.	30	g.r.t. = 1.2776 n.r.t. + 3894 (0.0421)	0.9706	1.7620	1.1763 to 2.5403
Ore carriers (b) Measured under U.S.A. and similar rules.	11	g.r.t. = 2.7252 n.r.t. + 1212 (0.638)	0.6696	2.7224	1.1520 to 5.5454
Bulk carriers	43	g.r.t. = 1.1931 n.r.t. + 3663 (0.0213)	0.9871	1.5614	1.2472 to 2.0122
Container Vessels	40	g.r.t. = 2.5811 n.r.t. + 197 (0.0527)	0.9595	1.7020	1.1918 to 2.3560
Ro/Ro Vessels	34	g.r.t. = 1.8380 n.r.t. + 631 (0.0533)	0.9738	2.3571	1.5755 to 3.4117
General Cargo Vessels	45	g.r.t. = 1.5891 n.r.t. + 290 (0.0367)	0.9776	1.7460	1.3933 to 2.1605
Passenger Vessels	12	g.r.t. = 1.8116 n.r.t. + 679 (0.06725)	0.9864	1.8951	1.5226 to 2.3314
All Vessels	253	g.r.t. = 1.2733 n.r.t. + 2930 (0.0147)	0.9676	1.8216	1.1321 to 2.7640

Table V.3. Percentage Differences in Price Level between Maximum and Minimum according to the Loading Degree (minimum loading degree = 100 per cent)

Port \ Trade	1978				1980			
	Tanker	Bulk	Container	Gen. C.	Tanker	Bulk	Container	Gen. C.
0	1	2	3	4	5	6	7	8
1. LONDON	2	38	1	7	2	38	1	7
2. SOUTHAMPTON	0	0	0	0	0	0	0	0
3. HAMBURG	0	0	0	0	0	0	0	0
4. ROTTERDAM	62	17	0	16	61	51	0	18
5. FLUSHING	46	43	8	17	47	47	10	20
6. ANTWERP	0	0	0	0	11	10	6	11
7. ZEEBRUGGE	42	29	24	50	42	26	27	50
8. DUNKIRK	60	33	23	56	58	32	25	47
9. CALAIS	72	50	33	70	71	43	26	74
10. AVERAGE	31.56	23.33	9.89	24.0	32.44	27.44	10.56	25.22

Table V.2. Port Dues Level Comparison (PLA = 100 in 1978)

PORT \ TRADE	TANKER				BULK				CONTAINER				GENEAL CARGO			
	1978		1980		1978		1980		1978		1980		1978		1980	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. LONDON	100	102	140	143	100	138	140	193	100	101	140	141	100	107	140	150
2. SOUTHAMPTON	115	115	174	174	158	158	242	242	96	96	146	146	96	96	146	146
3. HAMBURG	14*	14*	19*	19*	18*	18*	24*	24*	8*	8*	10*	10*	11*	11*	12*	12*
4. WILHELMSHAVEN	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
5. ROTTERDAM	34	55	46	74	36	42	37	56	21	21	27	27	25	29	33	39
6. FLUSHING	26	38	32	47	28	40	34	50	24	26	29	32	24	28	30	36
7. ANTWERP	49	49	45	50	55	55	51	56	35	35	34	36	39	39	37	41
8. ZEEBRUGGE	24	34	31	44	21	27	27	34	17	21	22	28	20	30	26	39
9. DUNKIRK	42	67	79	125	58	77	109	144	22	27	44	55	39	61	72	106
10. CALAIS	18	31	28	48	18	27	28	40	12	16	19	24	23	39	34	59
Variation coefficient	77	60	83	67	86	79	97	85	95	89	100	93	79	67	85	73

* These indices are calculated on the basis of the harbour dues only, whereas according to the official tariff quay dues seem to be added if using a quay berth for loading or discharging. They are composed of weight dues and tonnage dues (see next row). For handling bulk cargo the private companies charge the quay-dues in one amount.

Source: calculated upon data from "Port Dues Level Index" tables and official Port Tariffs.

Table V.4a. Comparison of Port Due Level Index for Different Vessel Types – 1978 (in U.S.$ per G.R.T.)

Ports \ Vessel type/ loading degree	Tanker		Bulk		Container		General Cargo	
	100%	75%	100%	75%	100%	75%	100%	75%
CONTINENTAL PORTS								
1. HAMBURG	0.137	0.137	0.162	0.162	0.102	0.102	0.134	0.134
2. ROTTERDAM	0.528	0.515	0.378	0.378	0.276	0.276	0.362	0.355
3. FLUSHING	0.357	0.345	0.356	0.356	0.339	0.312	0.356	0.353
4. ANTWERP	0.470	0.470	0.492	0.492	0.465	0.465	0.491	0.491
5. ZEEBRUGGE	0.324	0.291	0.240	0.223	0.243	0.222	0.316	0.284
6. DUNKIRK	0.637	0.568	0.698	0.652	0.317	0.295	0.630	0.562
7. CALAIS	0.298	0.262	0.243	0.221	0.180	0.165	0.390	0.339
average level	0.393	0.370	0.367	0.355	0.275	0.262	0.383	0.360
(standard deviation)	(0.165)	(0.154)	(0.182)	(0.173)	(0.117)	(0.117)	(0.153)	(0.139)
(variation coefficient)	(0.42)	(0.42)	(0.50)	(0.49)	(0.43)	(0.45)	(0.40)	(0.39)
BRITISH PORTS								
8. LONDON	0.972	0.967	1.247	1.152	1.336	1.324	1.326	1.310
9. SOUTHAMPTON	1.090	1.090	1.429	1.429	1.271	1.271	1.212	1.212
average level	1.031	1.029	1.338	1.291	1.304	1.298	1.269	1.261
(standard deviation)	(0.083)	(0.087)	(0.129)	(0.196)	(0.046)	(0.037)	(0.081)	(0.069)
(variation coefficient)	(0.08)	(0.08)	(0.10)	(0.15)	(0.04)	(0.03)	(0.06)	(0.05)

Source: tables appendix 3.

Note: Only loading degree levels 100% and 75% have been applied in all vessel types.

Table V.4b. Comparison of Port Due Level Indices for Different Vessel Types – 1980
(in U.S.$ per G.R.T.)

Vessel type/ loading degree / Ports	Tanker		Bulk		Container		General Cargo	
	100%	75%	100%	75%	100%	75%	100%	75%
CONTINENTAL PORTS								
1. HAMBURG	0.182	0.182	0.215	0.215	0.136	0.136	0.154	0.154
2. ROTTERDAM	0.706	0.690	0.509	0.509	0.356	0.356	0.488	0.479
3. FLUSHING	0.448	0.437	0.448	0.448	0.423	0.387	0.447	0.441
4. ANTWERP	0.475	0.461	0.502	0.486	0.460	0.449	0.495	0.481
5. ZEEBRUGGE	0.421	0.378	0.308	0.287	0.315	0.288	0.410	0.367
6. DUNKIRK	1.191	1.066	1.300	1.215	0.636	0.587	1.115	1.008
7. CALAIS	0.454	0.398	0.365	0.332	0.271	0.250	0.588	0.512
average level	0.554	0.516	0.521	0.499	0.371	0.350	0.528	0.492
(standard deviation)	(0.319)	(0.285)	(0.360)	(0.334)	(0.158)	(0.145)	(0.292)	(0.258)
(variation coefficient)	(0.58)	(0.55)	(0.69)	(0.67)	(0.43)	(0.41)	(0.55)	(0.52)
BRITISH PORTS								
8. LONDON	1.358	1.350	1.741	1.608	1.866	1.849	1.885	1.830
9. SOUTHAMPTON	1.656	1.656	2.181	2.181	1.934	1.934	1.841	1.841
average level	1.507	1.503	1.961	1.895	1.900	1.892	1.863	1.836
(standard deviation)	(0.211)	(0.216)	(0.311)	(0.405)	(0.048)	(0.060)	(0.031)	(0.008)
(variation coefficient)	(0.14)	(0.14)	(0.16)	(0.21)	(0.03)	(0.03)	(0.02)	(0.00)

Source: tables appendix 3.
Note: Only loading degree levels 100% and 75% have been applied in all vessel types.

PORT DUES LEVEL INDEX 25
Name : ANTWERP-BULK
Number of representants : 9 Number of objects : 250

No.	G.R.T.	Freq.	Net DWT	Relative Importance	PORT DUES IN U.S. DOLLAR (for different loading degrees)							
					1978				1980			
					100%	75% = 100%	50% = 100%	25% = 100%	100%	75%	50%	25%
	1	2	3	4	5	6	7	8	9	10	11	12
1	16034	2	26145	0.188	7888				8014	7778	7543	7308
2	18359	1	31333	0.432	9032				9226	8944	8662	8380
3	9831	1	15801	0.152	4837				4905	4763	4621	4479
4	14498	6	21011	0.024	7133				7151	6962	6773	6584
5	67523	1	124445	0.008	33219				24330	23209	22089	20969
6	41880	4	76299	0.016	20604				22596	21909	21222	20536
7	40229	9	75453	0.004	19791				22566	21886	21207	20528
8	28513	3	47123	0.052	14027				14273	13849	13425	13001
9	35082	1	65468	0.124	17259				17831	17242	16653	16063
10												
11												
12												
13												
14												
15												
PORT DUES LEVEL INDEX: $/G.R.T.					0.492				0.502	0.486	0.471	0.456

PORT DUES LEVEL INDEX 24
Name : ANTWERP-TANKER
Number of representants : 9 Number of objects : 250

No.	G.R.T.	Freq.	Net DWT	Relative Importance	PORT DUES IN U.S. DOLLAR (for different loading degrees)							
					1978				1980			
					100%	75% = 100%	50% = 100%	25% = 100%	100%	75%	50%	25%
	1	2	3	4	5	6	7	8	9	10	11	12
1	15203	3	24283	0.360	7479				7580	7362	7143	6924
2	27665	1	46573	0.044	13610				13880	13460	13041	12622
3	1183	12	1941	0.116	367				398	381	363	346
4	2591	2	4120	0.368	1275				1291	1254	1217	1180
5	52933	2	100465	0.028	26041				23466	22562	21657	20753
6	42294	2	80023	0.056	20807				22730	22010	21289	20569
7	67593	1	121871	0.020	33254				24237	23140	22043	20946
8	91082	1	169080	0.004	44809				25937	24415	22893	21371
9	1215	177	1718	0.004	271				219	204	188	173
10												
11												
12												
13												
14												
15												
PORT DUES LEVEL INDEX: $/G.R.T.					0.470				0.475	0.461	0.446	0.431

PORT DUES LEVEL INDEX 26
Name : ANTWERP-CONTAINER
Number of representants : 6 Number of objects : 175

No.	G.R.T.	Freq.	Net DWT	Relative Importance	PORT DUES IN U.S. DOLLAR (for different loading degrees)							
					1978				1980			
					150%	125% = 150%	100% = 150%	75% = 150%	150%	125%	100%	75%
	1	2	3	4	5	6	7	8	9	10	11	12
1	3963	3	5213	0.623	1950				2030	1983	1936	1889
2	15303	3	16921	0.097	7529				7664	7511	7359	7207
3	3753	22	3535	0.103	1044				1131	1099	1067	1035
4	2044	128	3323	0.017	462				461	431	401	371
5	29952	7	29486	0.143	14735				14804	14538	14273	14008
6	47443	1	51370	0.017	23340				23701	23238	22776	22314
7												
8												
9												
10												
11												
12												
13												
14												
15												
PORT DUES LEVEL INDEX: $/G.R.T.					0.465				0.482	0.471	0.460	0.449

PORT DUES LEVEL INDEX 27
Name : ANTWERP-GENERAL CARGO
Number of representants : 10 Number of objects : 250

No.	G.R.T.	Freq.	Net DWT	Relative Importance	PORT DUES IN U.S. DOLLAR (for different loading degrees)							
					1978				1980			
					150%	100% = 150%	75% = 150%	50% = 150%	150%	100%	75%	50%
	1	2	3	4	5	6	7	8	9	10	11	12
1	1689	2	2611	0.420	831				886	839	816	792
2	3775	5	5426	0.076	1857				1958	1860	1812	1763
3	568	6	907	0.100	279				300	283	275	267
4	2571	11	4555	0.016	1265				1380	1298	1257	1216
5	15460	2	20648	0.024	7606				7934	7563	7377	7191
6	7436	2	9991	0.092	3658				3658	3640	3550	3460
7	10031	2	14260	0.248	4935				5195	4938	4810	4681
8	574	16	1377	0.016	282				328	303	290	278
9	900	28	2060	0.004	238				325	288	269	251
10	32971	3	52225	0.004	16221				17364	16423	15953	15483
11												
12												
13												
14												
15												
PORT DUES LEVEL INDEX: $/G.R.T.					0.491				0.520	0.495	0.481	0.467

CLUSTER ANALYSIS No. 24
Method : COMPLETE LINKAGE CLUSTERING
Name : ANTWERP-TANKER
Criterion value : Class : 2 Lower bound : 1.0654476 Upper bound : 2.1308952
Number of clusters : 9 Number of objects to cluster : 250

Cluster No.	Number of objects	Mean values				Standard deviations				Variation coefficients			
		Var. 1	Var. 2	Var. 3	Var. 4	Var. 1	Var. 2	Var. 3	Var. 4	Var. 1	Var. 2	Var. 3	Var. 4
1	90	100	15203	24283	2.51	0	2729	4877	2.57	0	18	20	102
2	11	100	27665	46573	1.18	0	2474	6760	0.40	0	9	15	34
3	29	100	1183	1941	11.66	0	696	1125	3.12	0	59	58	27
4	92	100	2591	4120	2.42	0	2177	2971	1.51	0	84	72	62
5	7	100	52933	100465	1.57	0	3229	5053	1.51	0	6	5	96
6	14	100	42294	80023	1.86	0	2777	9036	1.41	0	7	11	76
7	5	100	67593	121871	1.20	0	6668	9716	0.45	0	10	8	37
8	1	100	91082	169080	1	0	0	0	0	0	0	0	0
9	1	100	1215	1718	177	0	0	0	0	0	0	0	0

CLUSTER ANALYSIS No. 25
Method : COMPLETE LINKAGE CLUSTERING
Name : ANTWERP-BULK
Criterion value : Class : 6 Lower bound : 3.4923260 Upper bound : 4.1907912
Number of clusters : 9 Number of objects to cluster : 250

Cluster No.	Number of objects	Mean values				Standard deviations				Variation coefficients			
		Var. 1	Var. 2	Var. 3	Var. 4	Var. 1	Var. 2	Var. 3	Var. 4	Var. 1	Var. 2	Var. 3	Var. 4
1	47	100	16034	26145	2.38	0	2619	4638	0.57	0	16	18	24
2	108	100	18359	31333	1	0	3491	7116	0	0	19	23	0
3	38	100	9831	15801	1.24	0	1858	3291	0.43	0	19	21	34
4	6	100	14498	21011	6	0	1604	6303	1.10	0	11	30	18
5	2	100	67523	124445	1	0	3377	6993	0	0	5	6	0
6	4	100	41880	76299	4.25	0	2287	2099	0.96	0	5	3	23
7	1	100	40299	75453	9	0	0	0	0	0	0	0	0
8	13	100	28513	47123	2.85	0	2681	6152	1.07	0	9	13	38
9	31	100	35082	65468	1.13	0	4659	13637	0.34	0	13	21	30

CLUSTER ANALYSIS No. 26
Method : COMPLETE LINKAGE CLUSTERING
Name : ANTWERP-CONTAINER
Criterion value : Class : 4 Lower bound : 2.0158008 Upper bound : 2.6877344
Number of clusters : 6 Number of objects to cluster : 175

Cluster No.	Number of objects	Mean values				Standard deviations				Variation coefficients			
		Var. 1	Var. 2	Var. 3	Var. 4	Var. 1	Var. 2	Var. 3	Var. 4	Var. 1	Var. 2	Var. 3	Var. 4
1	100	100	3963	5213	3.11	0	2859	3151	2.54	0	72	60	82
2	17	100	15303	16921	3.35	0	2275	2486	1.97	0	15	15	59
3	18	100	3753	3535	22.06	0	1956	1626	9.97	0	52	46	45
4	3	100	2044	3323	128.33	0	395	1009	17.16	0	19	30	13
5	25	100	29952	29486	6.88	0	3702	5269	5.11	0	12	18	74
6	3	100	47443	51370	1.33	0	9846	5571	0.58	0	21	11	43

(Continued on next page bottom)

Systems for Dues on Ships and Goods

By Ole Vatnan
Coast Director
Coast Directorate, Norway

In Norway about 15% of the domestic cargo volumes are transported by ships. But as it mostly concerns long distance transport, about 60% of the domestic transport work (ton-km) is carried out by ships. Regarding foreign trade, about 70% of the general cargo and more than 90% of bulk commodities are seaborne.

Only a few years ago cargo transport by sea in Norway, had little or no competition from other means of transport on most destinations domestic or abroad. Today this is changed for general cargo in domestic trade and in foreign trade in Northern Europe. Sea-transport therefore has lost market during the recent years.

The connecting link between sea-transport and other means of transport are taken care of by some 60 public ports – most of them small local ports. In addition we have several privately owned cargo terminals as part of industrial enterprises outside the public port system.

As will be seen, sea-transport and port-industry are of great importance in the Norwegian transport system and therefore we are very interested in all aspects of sea transport and also in the question of dues on ships and cargo. It therefore was very interesting to read the information about a new French system for dues on ships in the July-August volume of "Ports and Harbors", given by Inspector for all non-autonomous French Ports, Mr Bastard. However, I missed a more precise definition of the overall aim and principles for the new system and I hope Mr Bastard will give us information about that in a later paper. I am sure that many port board members and managers also will find it most interesting.

Port dues normally count for a relatively small part of the transport costs. But in a market with competition between ports and between the different means of transport, even a small element of cost will influence on the distribution and choice of transport. In Norway we therefore have prepared a new system for dues on ships and cargo to replace a complicated and old system which have no relation to modern transport economy.

Dues on ships and goods should, besides giving the port income, be a remedy which contributes to secure an economic correct distribution of transport. This means I think, that if we want a rational distribution of transport between ports and between sea-transport and other means of transport, the dues for each port must pay for the expenses for running the port, maintenance, capital cost etc. This also includes, I think, that the dues must be so framed that one get an optimal utilization of resources in the port, get a basis for dimensioning port facilities, get a distribution of dues on port users conformed to the consumption of resources and, last but not least that one get simple routines for counting as well as levying dues.

In short this means that there must be a close connection between dues and costs. Therefore one must leave the principle to take the money where you for the moment can do it easiest and which most often means that you base most of your income on the value of cargo handled.

In fact, there are some difficulties in calculating dues on a basis of marginal cost or average cost, and therefore you have to do some modifications, but this can not be an exemption from trying to get the best correlation between dues and costs.

The Norwegian Coast Directorate has proposed to the Minister that we change to a system for port dues based on the port's cost and with 3 categories of dues:

- One due imposed on all ships which call the port
- One due imposed on ships which come alongside quay
- Dues on goods which are handled over the quays

The two first categories we propose to be based on the over all length of ships with some progression in the rates taking care of breadth and draught. Therefore I am very glad seeing that in France it has been a success changing over to a L x b x d – basis from the not meaningfull g.r.t or n.r.t. basis.

The third category of dues, on goods which are handled over quays, is proposed based on rates per tonnage. For general cargo we have found it sufficient accurate, to propose a common rate per tonnage. For bulk we think we must have a few special rates. If costs do it correct it is assumed given discounts to regular users.

This proposed new system for dues in ports, is now under discussion in the Ministry and we hope we can have a decision in short time to the best for an effective transport system and for sea-transport and port-industries.

(Continued from page 23)

CLUSTER ANALYSIS No. 27
Method : COMPLETE LINKAGE CLUSTERING
Name : ANTWERP-GENERAL CARGO
Criterion value : Class : 4 Lower bound : 2.7213756 Upper bound : 3.6285008
Number of clusters : 10 Number of objects to cluster : 250

Cluster No.	Number of objects	Mean values				Standard deviations				Variation coefficients			
		Var. 1	Var. 2	Var. 3	Var. 4	Var. 1	Var. 2	Var. 3	Var. 4	Var. 1	Var. 2	Var. 3	Var. 4
1	105	100	1689	2611	1.65	0	1406	1863	0.77	0	83	71	47
2	19	100	3775	5426	4.53	0	1702	2132	1.02	0	45	39	23
3	25	100	568	907	6.04	0	321	380	1.59	0	56	42	26
4	4	100	2571	4555	11	0	1149	920	2.45	0	45	20	22
5	6	100	15460	20648	2	0	1019	2099	1.10	0	7	10	55
6	23	100	7436	9991	1.70	0	813	1845	0.97	0	11	18	57
7	62	100	10031	14260	1.94	0	980	1798	1.28	0	10	13	66
8	4	100	574	1377	16.25	0	298	958	2.06	0	52	70	13
9	1	100	900	2060	28	0	0	0	0	0	0	0	0
10	1	100	32971	52225	3	0	0	0	0	0	0	0	0

American Seaports

A National Asset is Threatened

(Reprinted from PORT RECORD by the Port of New Orleans)

By Edward S. Reed
Executive Director/General Manager, Port of New Orleans
Chairman of the American Association of Port Authorities

The U.S. seaport system is as important today as it has ever been, and in many ways, much more so. Each year, these ports handle the millions of tons of cargo that move in the foreign and domestic ocean trades of the United States. At the same time economic activity spawned by the port industry pumps billions of dollars into the national economy and accounts, directly and indirectly, for thousands of jobs. Data developed by the U.S. Maritime Administration indicates that in 1977, for example, the U.S. port industry was responsible for:

- Gross sales within the economy of $28 billion
- A $15 billion contribution to U.S. gross national product
- 4,046,800 jobs
- Personal income of $96 billion
- Business income of $3.7 billion
- Federal tax and customs revenue amounting to $5.2 billion
- and state and local taxes totaling $2 billion.

The same MARAD study also indicated that each ton of waterborne cargo in U.S. foreign trade generated revenues directly and indirectly amounting to $55. Other significant findings were:

- The movement of every 600 long tons in waterborne foreign trade created one job in the national economy.
- Every million dollar increase in the nation's exports required an average increase of $160,000 worth of port services.
- Direct purchases of goods and services by the port industry itself from other industries totaled $8.9 billion dollars.
- Direct and indirect impact of port investments totaled $2.1 billion dollars.

Current 1982 dollars would, of course, be substantially greater in every category due to inflation and the general expansion of the national economy since 1977. The point is that the port industry significantly affects virtually every sector of the national economy, but most particularly in the area of foreign trade.

Foreign commerce is crucial to the U.S. economy. An expanding international market is especially important in times when demand at home is sluggish or declining. While air cargo has grown significantly since 1960, most of the tonnage in U.S. foreign trade is carried by ship and is, therefore, dependent on the seaport link. In 1978, for example, foreign waterborne commerce passing through U.S. ports amounted to 903.2 million tons valued at $197.9 billion.

The U.S. is the world's leading supplier of coal and agricultural commodities, and ranks with Germany and Japan as an exporter of manufactured products. At the same time, the U.S. has become increasingly dependent on other nations for many essential raw materials, the most important being petroleum. The importance of foreign trade to this country is evident in the fact that in 1976 exports accounted for 7% of the output and for 6.3% of employment in U.S. manufacturing industries.

Foreign markets are especially important to the American farmer. Nearly 25% of U.S. farm cash receipts come from export sales. Approximately one out of every three acres American farmers harvest are used for growing export crops. During fiscal year 1980, according to U.S. Department of Agriculture, U.S. farm exports totaled 137.5 million metric tons valued at $40.5 billion. For agricultural exports, there is simply no economical alternative to ocean transport. Farm commodities in one form or another are shipped through virtually every deep-draft port in the United States.

The U.S. has been the world's foremost coal exporter for more than thirty years. Until recently, much of that exported overseas has been high-grade metallurgical coal. During the 1970's U.S. overseas coal exports average 46.9 million tons annually, the high being 52.3 million tons in 1971.

Since Autumn of 1979, however, the complexion of the overseas coal market has changed radically with the sudden and continuing upsurge of U.S. steam coal exports to the energy-hungry nations of Western Europe. Whereas in 1978, U.S. steam coal exports to non-Canadian destinations amounted to 311,000 tons, in 1979 they jumped to 2.5 million tons, and in 1980 to 16 million tons. Unexpectedly heavy metallurgical coal movements brought total U.S. overseas coal exports to 72.8 million tons, 84% more than in 1979.

America's dependence on imports is equally emphatic. Some 45% of the U.S. petroleum supply comes from foreign sources. While conservation and increasing change to non-oil energy alternatives have caused a steady dropping off of U.S. petroleum imports, substantial tonnages will continue flowing into this country from abroad for many years to come. Imports of natural gas, rather negligible in the past, have increased steadily since 1978.

Crude oil and various petroleum products – gasoline, jet fuel, residual fuel oil, kerosene and so forth – are handled in significant quantity by virtually every major commercial port in the U.S.

Containerization has revolutionized the handling of general cargo at all major U.S. ports. Forty percent of the investments made by ports in new and improved facilities between 1973 and 1978 went for intermodal terminals, and that mostly to accommodate containers. Not surprisingly, well over half the general cargo handled at most major U.S. ports is containerized, and the trend is accelerating.

But the challenge is ongoing. Foreign cargoes moving through U.S. ports are projected by the U.S. Maritime Administration to increase almost 40%, or 333 million tons over the next decade. Substantial growth is likewise anticipated in the domestic ocean trades. Overall, U.S. port cargo is expected to increase 32% to a total of two billion tons by 1990.

Cargo ships of the future are almost certain to be larger and more complex than those of the present. Larger ships

will require deeper and wider channels, larger berths, higher capacity transloaders and additional storage areas.

Meeting those challenges will necessitate heavy investment in port infrastructure in the decade ahead. The billions of dollars the U.S. port industry has sunk into terminal infrastructure since World II is clear evidence of a commitment to serve the shipping needs of the nation. That commitment and dedication remain, but those qualities cannot do the job alone. Public port authorities operate close to the break-even point; some lose money from marine terminal operations. Many are required by law to be self-supporting. Others are losing the relatively easy access they once enjoyed to state and local government financial resources.

Inflation has hit the port industry hard. Ten years ago, it cost one U.S. port $1,500 a running foot to build a 103-foot dock. Today, it would be in excess of $6,000. Container cranes, priced in the $500,000 range in 1970 now sell for $3,000,000 or more. Operating expenses have soared as a result of the upward spiraling of energy prices. With the price rate hovering around 20%, investment capital is expensive to come by and difficult to find.

Complicating the situation further is the fact that our federal partner has simply failed to fulfill its responsibilities and, in fact has been making it harder and harder for port operators to stay in business. Federal laws and regulations intrude into virtually every facet of port management and contribute additionally to the burden of costs must shoulder.

Dredging represents the federal gevernment's traditional contribution to the U.S. port system. Without adequately constructed and maintained ship channels, seaports simply cannot function and develop. The federal government's performance of this essential function is understandably a critical concern of port managers, whose ability to plan effectively depends very much on assurances that the federal government will do what it is supposed to do.

The present intricacy of the authorizing process, with the necessity for port dredging projects to conform to amorphous environmental standards and the increasing number of federal agencies which must comment or provide some form of approval before the Corps of Engineers can proceed with actual construction has resulted in no major waterway starts in the last six years. Additionally, by the Corps' own recent testimony before a Congressional Committee, the Corps estimates a major waterway project initiated today would take 21 years to bring to operation. Obviously, this is a totally unacceptable situation.

The coal crisis has created new national awareness of the problems our ports have been facing for years. The situation confirms that if U.S. foreign commerce is to expand – as indeed it must – needed facilities, including deeper and regularly maintained channels must be provided. The port authorities and private sector interests have repeatedly demonstrated a determination to meet their responsibilities, but the federal government has not kept pace, and in fact, has raised a specter that could endanger the competitive stance of our whole export program.

Perhaps the most ominous problem facing the U.S. port industry today is a growing sense in some quarters that the ports themselves should assume more of the finacial burden of providing these channels. In point of fact, the federal participation in dredging and other deepwater navigation projects has been conditioned on local agreement to provide easements, rights of way, land and disposal areas, and to satisfy other requirements that have effectively forced non-federal participants to shoulder more than thirty percent of the total project costs.

This specter potentially disastrous to the whole maritime structure of our nation is as yet an unanalyzable array of "cost-sharing, cost-recovery user charges" initiated by the national administration and primarily orchestrated by the Office of Management and Budget and the U.S. Department of Transportation. This cumulative litany of "transportation taxes" is in the form of the presently in-place tax on tugboat diesel fuel. This will soon be escalated from six cents to twelve cents per gallon, and it is rumored it could go higher. The administration has proposed a "segmented cost recovery charge" on each lock or other river structure, to be imposed on all vessels traversing that portion of the waterway system. Also proposed is a charge to recover the costs of waterway maintenance and operations of existing channels. This has long been a responsibility of the federal government based on the historical premise that the waterways benefit the nation not just the ports or states bordering them, and that "they shall ever be free." Also proposed is a charge to recover from the user any deepening costs of our waterway system and an additional charge to recover the cost of operating the U.S. Coast Guard, and a further charge to recover the cost of operating the U.S. Customs Service, notwithstanding the fact that Customs is presently collecting over $9 billion per year, more than half of which ($5.3 billion) comes from port activities. Further, the U.S. Treasury is considering removing the tax exempt status of a whole array of financing options now available for the construction of public port facilities.

While an appealing case can be made for "user charges" as a philosophy, no analysis has been made on the cumulative effect of these proposed charges on U.S. exports in the world marketplace. Our nation's two largest exports and our principal source of international revenues are grain and coal, both commodities selling on very narrow margins in a highly competitive world market. Yet to date no consideration is being given on a national level to the potentially disastrous cumulative effects of these proposed charges.

Ports serve the commercial, fishing, and defense needs of the entire nation, and not merely those of the states and communities where they happen to be located. Assessing a local port authority in one state for the costs of dredging and maintaining a harbor and channels that serve the commercial needs of a multi-state region is, it seems obvious, most inequitable.

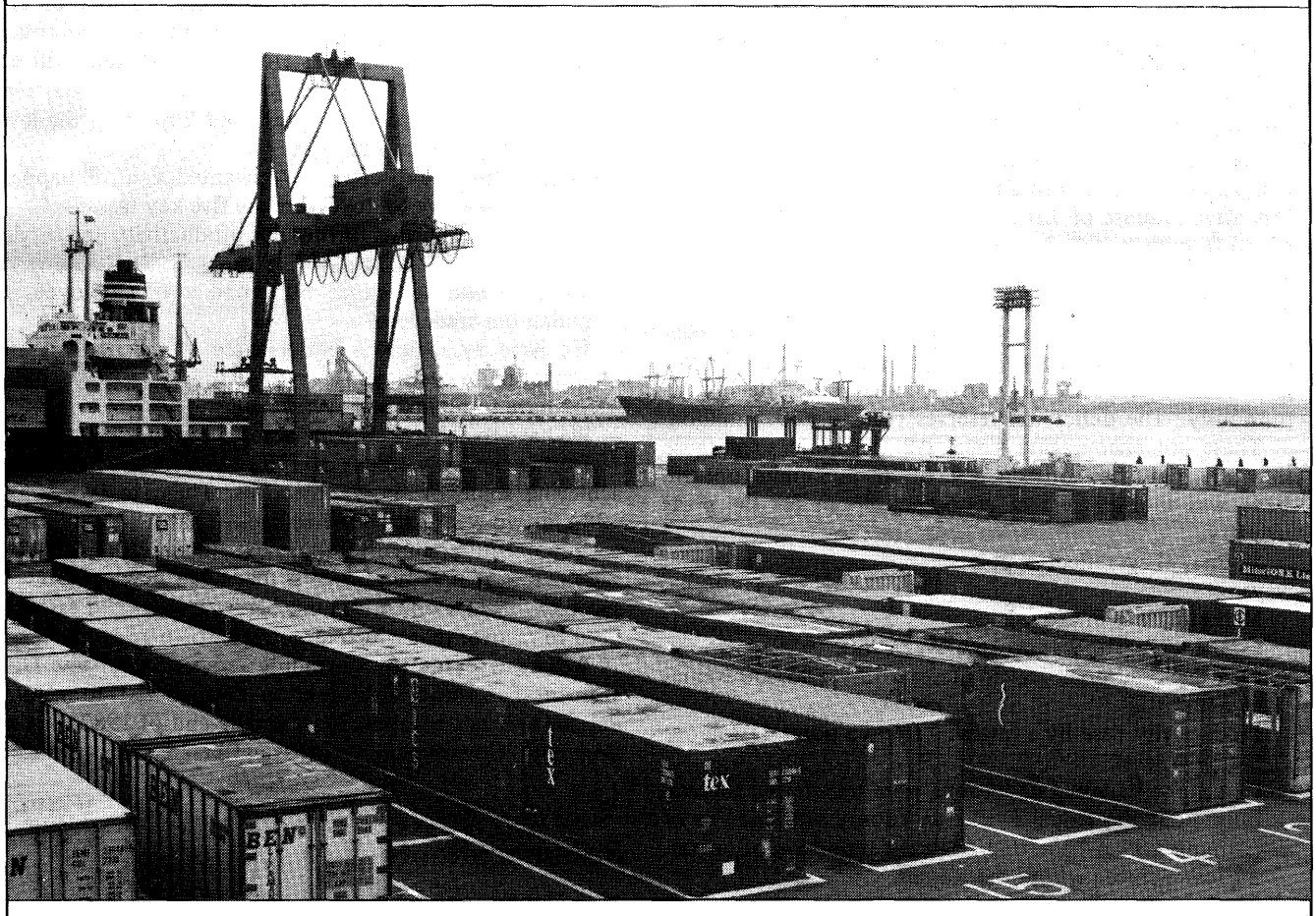
Even more to the point is the fact that seaports are an extremely lucrative source of federal revenue. In 1979, for example, the U.S. government collected $5.3 billion in customs revenues and $12 million in vessel fees at U.S. ports. In contrast, the Corps' FY 1980 appropriation for navigation projects affecting channels and harbors of more than twenty feet totaled just $352.2 million. Moreover, port operators are required to furnish the Customs Service with office facilities at minimal or no cost. These Customs revenues are in addition to the billion of dollars in income tax revenues generated by port authorities.

America's ports are a national asset. They are essential to the economic well-being of the country. They are the cutting edge of our international trade. Indeed, many ports

(Continued on page 28 bottom)

PORT OF NAGOYA

Ocean Entrance to the Central Japan Economic Region



- Port of Nagoya offers most modern and finest facilities.
- Port of Nagoya takes any type of cargo at specific piers.
- Port of Nagoya handles over 100 million tons of cargo yearly.
- Port of Nagoya plans further modernization and integration of its facilities.

NAGOYA PORT AUTHORITY

8-21, 1-chome, Irifune, Minato-ku, Nagoya, Japan

Port of London

(Extracts from Port of London Authority Report and Accounts 1981)

Chairman's statement (extract)

1981 was a year of improvement for the PLA. It is a pleasure to register that, but at the same time we must ackowledge that major problems exist in achieving an early return to viability.

We produced an operating profit of £3.7 million in 1981 compared with a loss of £1.6 million in 1980. The Group loss after interest of £10.8 million and restructuring costs of £1.0 million fell to £8.2 million as compared with £19.3 million in 1980. As is mentioned in the finance section of the Report, the figures for the Group loss in 1981 are not strictly comparable with those of the previous year as some of the Government grants received in 1981 were not credited to Profit and Loss account as had been done previously. The deficit on reserves rose to £39.2 million.

These are encouraging signs. All the more so because they are not the consequence of an economic upturn. 1981 was another year of economic gloom for the ports industry.

Rather, they reflect a port making progress. In several ways –

Marketing was improved.

Container traffic was up 16% over 1980.

PLA enclosed dock traffic increased by 500,000 tonnes overall.

Productivity rose by a further 11% to a point 41% above the 1977 level.

PLA cargo handling operations were transferred successfully from the Royal Docks to Tilbury without loss of customers. PLA benefited from the reduction of operating loss incurred within the Royals.

Further progress was made towards the objective of aligning manpower resources to trade handled. Sadly this meant a reduction of 1,235 employees (19%). This follows a reduction of over 1,900 employees in 1980 (22%), but such action is vital for the survival of the PLA.

The progress was the result of the hard work and dedication to the success of the Authority by employees at all levels, and none more so than the executive managemant.

If 1981 showed such encouraging signs, why is the PLA still in crisis?

First, the scale of our past losses and operating difficulties has been so massive that it can only be rectified over a period greater than a year. 1981 was important. It showed the prospect of success but not its achievement.

Second, we still need to reduce the number of emplyees. The recently announced arrangements for voluntary severance payments for registered dock workers will enchance the prospect of this being achieved.

Third, the UK economy is still not improving the level of traffic within the ports.

Fourth, the unexpected, the unwanted, can still happen.

So what have we to do? There are five key tasks –

- We have to improve further our productivity and service levels
- We have still to reduce our number of employees to match our trade level
- We have to achieve a better share of the market, and attract more customers
- We have to reduce our overheads
- We have to achieve a financial restructuring. That is vital.

During the early weeks of 1982 we were on the way to achieving some of those objectives. Then, in late March 1982, a two-week strike set us back. That will be a matter for report and comment in our next Report. It is, however, sad to reflect that the progress made can be eliminated so speedily. 1982's objectives must now include the essential need to recover that which has been thrown away.

We are working to demanding requirements. The Government has stated its intention that grants for meeting deficits will not be available after the end of 1982. Discussion with Government on this matter are well advanced.

V.G.Paige
Chairman

Balance sheets

as at 31st December 1981

	PLA Group 1981 £000	PLA Group 1980 £000
Employment of capital		
Net fixed assets	76,451	81,145
Investments	7,060	6,740
	83,511	87,885
Net current liabilities	(7,729)	(10,474)
	75,782	77,411
Financed by		
Port Stock	19,699	19,699
Harbour Act loans	60,810	63,583
Medium term loans	22,000	25,000
Repayable Government grants	11,967	–
	114,476	108,282
Reserves	(39,187)	(30,999)
	75,289	77,283
Minority interest	166	128
Obligations under finance lease	327	–
	75,782	77,411

(Continued from page 26)

actively promote trade development through their overseas offices and participation in trade delegations sent abroad. Federal expenditures for channels and harbors should be viewed not as a cost to government, but as an investment in the future of this country. It is time that Congress officially recognizes the importance of ports to this nation's economy and security.

Group profit and loss account

for the year ended 31st December 1981

	1981 £000	1980 £000
Operating revenue	84,473	82,184
Operating expenditure	80,180	83,829
Operating profit (1980 loss)	3,663	(1,645)
Net interest	10,825	10,863
Taxation	–	–

	1981 £000	1980 £000
Loss from continuing operations before minority interest	(7,162)	(12,508)
Profit attributable to minority interest	38	5
Loss from continuing operations	(7,200)	(12,513)
Net cost of restructuring	988	6,813
Loss for the year	(8,188)	(19,326)

Trade of the Port of London

million tonnes

	Imports			Exports			Total		
	1981	1980	1979	1981	1980	1979	1981	1980	1979
PLA Dock Premises									
Conventional berths	0.6	0.5	0.8	0.7	0.7	0.9	1.3	1.2	1.7
Unit load berths	1.5	1.3	1.5	1.4	1.2	1.2	2.9	2.5	2.7
Bulk grain facilities	1.6	1.6	1.6	0.4	0.4	0.3	2.0	2.0	1.9
Forest product berths	1.3	1.3	1.4	–	–	–	1.3	1.3	1.4
	5.0	4.7	5.3	2.5	2.3	2.4	7.5	7.0	7.7
River									
Oil, crude & products	16.5	18.6	19.9	4.5	4.9	4.2	21.0	23.5	24.1
Aggregates	5.1	5.4	4.7	–	–	–	5.1	5.4	4.7
Coal	3.5	3.6	3.2	–	–	–	3.5	3.6	3.2
Other	4.9	6.0	6.0	2.0	2.6	2.9	6.9	8.6	8.9
	30.0	33.6	33.8	6.5	7.5	7.1	36.5	41.1	40.9
Port Total	35.0	38.3	39.1	9.0	9.8	9.5	44.0	48.1	48.6

International maritime information: World port news:

Review of Information on "Special Care" Techniques for the Disposal of Contaminated Dredged Material

Submitted by the International Association of Ports and Harbors (IAPH)

(IMO Document: LDC/SG.6/3, 21 July 1982)

1. The Sixth Consultative Meeting took note of the interest of IAPH in special care measures associated with the disposal of dredged material and its offer to make available its technical expertise to the Ad Hoc Scientific Group on Dumping, with particular reference to further reports concerning the development of and experience with "special care" techniques (LDC VI/12, paragraph 3.13).
2. A report prepared by IAPH describing the recent development of special care measures for safe disposal of polluted dredged material is set out at Annex. This report updates LDC/SG.V/10.
3. The Ad Hoc Scientific Group is invited to consider the suggestions of IAPH for solving problems which arise as a result of the need to dispose of at sea dredged material containing Annex I substances, and in particular the recommendations set out in the final section of the document.

ANNEX

An Updating of Special Care Measures for Safe Disposal of Polluted Dredged Material in the Marine Environment

By the International Association of Ports and Harbors

For Consideration of the Ad Hoc Scientific Group on Dumping at its Sixth Meeting

Contents

Acknowledgement

The International Association of Ports and Harbors (IAPH) wishes to thank its member ports and the American Association of Port Authorities, along with the International Association of Dredging Companies, for their continuing financial and technical support in the presentations made by the IAPH to the Ad Hoc Scientific Group and to the Contracting Parties of the London Dumping Convention. IAPH also wishes to recognize the excellent job done by Dr. Willis E. Pequegnat in preparing the original paper on "special care" measures and the present updated paper as an integral part of the IAPH presentation.

30 June, 1982
New Orleans, Louisiana

Herbert R. Haar, Jr.
Chairman, Dredging Task Force, IAPH

Executive Summary

Introduction

General

The present paper contains an updating and expansion of the "special care" paper that IAPH submitted to the 5th meeting of the Ad Hoc Scientific Group on Dumping in Halifax on May 5th, 1981. It fulfills in part Herbert R. Haar's assurances to the Contracting Parties of the London Dumping Convention, on the occasion of the Sixth Consultative Meeting of the Convention (October 1981) in London, that IAPH will continue to use its expertise in studying and evaluating "special care" techniques and reporting its findings to future meetings of the Group and the Convention. At the outset it is fair to say that submission of this paper should not compromise our conviction that most dredged material is unpolluted and can therefore be disposed in the ocean with no environmental risk so that employment of expensive mitigative measures is unnecessary. It is emphasized, therefore, that special care mitigative measures are intended to be used primarily when the need arises to dispose in the ocean dredged materials containing substantial levels of Annex I chemicals.

Objectives

The principal objectives of this paper are (1) to provide the latest information available from ongoing studies of "special care" measures discussed in the 1981 paper, (2) to describe and evaluate additional special care methods of both dredging and disposing that have come to the attention of IAPH since the Halifax meeting, and (3) to submit this paper to the Ad Hoc Scientific Group on Dumping on the occasion of their meeting in Paris during September 1982. Further, in order to enhance the value of the paper's contents to deliberations of the Group an addendum describing further evaluations of capping of polluted dredged material (PDM) in Long Island Sound, New York Bight, the Netherlands, Japan, and elsewhere will be provided by IAPH prior to the Paris meeting.

Nature of capping

Because sediment capping appears to be a special care measure that promises to be more widely used in the near future, it is emphasized in this paper. For those unfamiliar with the term, capping involves the covering of polluted sediments with other sediments that are deemed to be relatively harmless to the totality of the aquatic environment. Successful capping requires that the polluted sediments shall be isolated from the effects of factors of the biophysical environment that range from the bioturbation of burrowing macroinfauna to turbulent transport of cap sediments by storm waves and currents.

Three kinds of capping are developed sufficiently to be included in this paper, viz., level bottom, submarine pit, and in situ capping. The first two are related in that polluted sediments are actually dredged, transported to a dumpsite, and then covered with clean sediments. As its name suggests, in situ capping on the other hand involves leaving the polluted sediments in place but restoring the value of the bottom by dredging clean sediments from an appropriate area and spreading them over the polluted bottom.

Special Care Measures of Disposal

Measures discussed previously

Clean material capping in the United States

Level bottom capping

- The technique and its rationale

In clean material capping on level bottoms relatively large volumes of polluted dredged material (PDM) are emplaced at a dumpsite and then covered with a reasonably thick covering of clean sediment. When properly carried out, this operation will (1) stabilize the dumped PDM and prevent its further spread over the seabed, (2) prevent the migration

from the PDM of pollutants and nutrients into the cap, and (3) prevent animals that populate the cap from burrowing into the PDM or those in the latter from moving through the cap to the sediment surface where there could be some transfer to the food web of man.

- Preliminary results of monitoring U.S. capping

Long Island Sound. The results of monitoring the level bottom capping during the past year revealed that

(a) the center of the cap is about 1m thick,
(b) the cap's flanks have been covered by several centimeters of the ambient or surrounding sediments
(c) the central area of the cap has been populated by substantial numbers of macroinfaunal species and individuals.

New York Bight. After a one-year monitoring project that was carried out on the capped and uncapped portions of the Mud Dump in the Bight off New York Harbor, it was concluded

(a) that the cap has retained its integrity,
(b) that where clean material was used to form the cap there was no evidence of movement of pollutants from the PDM into the cap, and
(c) the bioaccumulation studies on the blue mussel Mytilus edulis show that the uptake of toxic metals was somewhat greater in those individuals exposed at the uncapped (northwest) part of the Mud Dump than in those exposed on top of the cap.

Expressions of concern by opponents of level bottom capping

The following four concerns, which are answered herewith, are frequently raised by those who question the efficacy of level bottom capping. Brief answers are provided for each problem.

1. That there is movement of toxic chemicals from the polluted dredged material (PDM) into and through the cap from which they enter the food web.
   Response: In the 1981 IAPH paper this concern was shown to be unfounded. In fact, conditions are created in the PDM mound which sequester both toxic metals and chlorinated hydrocarbons.
2. That there is movement of harmful materials from the PDM into the cap from which they might escape into the water column and the food web.
   Response: Recent findings show that this appears not to be the case. In fact, it is suggested by some bacteriologists that the PDM and cap in the Mud Dump can be separated by the presence of thermoactinomycete bacteria in the former and not in the latter, suggesting that there is no exchange.
3. That burrowing (macroinfaunal) organisms will dig through the cap into the PDM and thus will accumulate pollutants and possibly pass them into the food web.
   Response: If the cap is properly placed and is of sufficient thickness, there is little chance that burrowers will move through the cap into the PDM and return to the surface. Moreover, if the cap is made of sandy material, as is recommended, and the PDM is of mud, as is usually the case in maintenance dredging, then it is unlikely that organisms that prefer sand would continue to burrow downward when they encounter the sand/mud interface.
4. That caps are easily disrupted by storms, as a result of which PDM will be exposed to the water column and food organisms.
   Response: This will not occur if good judgment is used in selecting the proper dumpsite for capping operations. Ideal places are those in which water movements are low-energy, even in storms. Thus, if a site is not sheltered, it must be deep enough that storm waves will not stir up the bottom. A rule of thumb in this regard is simply that a wave's ability to affect bottom sediments is proportional, meter for meter, to its wave length.

Submarine or borrow pit capping

Although submarine pit capping may well have several advantages over level bottom capping, it has not as yet been tried in U.S. waters. Plans had been drawn to carry out in summer 1982 a research capping experiment in a large pit located in the Lower Bay of New York Harbor but a legal suit filed against the State of New York by the Natural Resources Protective Association has delayed plans pending the outcome of the appeal filed by the State.

- Advantages over level bottom capping

Submarine pit capping has less potential for wave or current erosion than level bottom capping; hence it can be carried out in relatively shallow water. Moreover, it has the potential for reclaiming and enhancing the seabed environment when the pit, which is often anoxic, is filled partially with contaminated DM and then leveled with a cap of material similar to that of the surrounding bottom.

- Where potentially useful submarine pits are found

Man-made pits resulted from submarine mining for sand and gravel, an industry that is likely to increase in the future. It has been estimated that at least 125 potentially useful pits, some of which are of natural origin, exist in estuaries, bays, rivers, and continental shelf areas of the U.S.

- Appropriate submarine pits

A potentially suitable pit for submarine capping must be appropriately large for the dredging at hand but in any event it should have a minimum radius of about 230 m and a wall height of 5 m.

- Placement of material in the pits

It is recommended that fine-grained, polluted sediments should be removed by clamshell dredging operations in order to preserve their natural cohesiveness. The large blocks formed by this method will produce a pile having side slopes of 6° to 7°. As a guide, it is anticipated that a pile composed of 150,000 m^3 of such blocks, when dumped with precision navigation, should have a radius of about 90 m and 6° side slopes. Such a configuration will permit formation of a very stable cap. It is recommended that the cap should be made of sediments that have the same texture as the surrounding seabed.

- Environmental soundness at capping

Evidence at hand indicates that level bottom capping, when carried out properly, is environmentally sound. There appear to be good reasons for believing that the filling and capping of appropriate submarine pits will be environmentally advantageous.

Clean material capping outside the United States

In the Netherlands

- Previous or ongoing projects

Mr. C. van der Burgt has informed IAPH that in the Netherlands three projects involving disposal of polluted dredged material either have been carried out or are in planning stages. One was undertaken in Ijmuiden Seaport in 1979 where 70,000 m^3 of polluted sediment from "Hoogovenhaven"was dumped into a former sandy salvage basin, which it is anticipated will be covered by natural sediment transport and accumulation. The other project is being carried out in the port of Rotterdam. Submarine pits will be created by suction dredging and then filled with contaminated dredged material from the "1st Petroleumhaven". At present this project is tied up in court.

- A future capping project

Rijkswaterstaat is planning to carry out an offshore submarine pit operation for the diking and burial of contaminated sediments taken from the entrance of the harbor at Hoek van Holland. This offshore project will accommodate as much as 200 million cubic yards of polluted sediment. Mr. van der Burgt sees open ocean disposal as the only feasible solution to their problem of disposing of large amounts of dredged material. To this end they are studying sediment transport on the seabed of the open ocean.

In Japan

The deposition of toxic materials on seabeds in harbors and bays has become a serious pollution problem in Japan. The Japanese are presently undertaking two approaches toward the solution of this problem, viz., in situ capping of contaminated seabeds and processing of sediments to produce dehydrated cakes for land disposal.

- Seabed enhancement by sand-spreader capping

The objective here is to restore the biologic value of contaminated seabed by covering with a uniform layer of clean sand. This capping technique has been carried out by two methods – using a sand-spreader barge or a conveyor barge equipped with a tremie tube. Care must be taken to not cause the release of toxicants and/or phytoplankton nutrients from the low-grade sediments. Such a release of nutrients has been cited by fishermen as the cause of eutrophication in the Seto Inland Sea, which is essentially an enclosed basin.

- Environmental soundness of in situ capping of PDM

There is no doubt that in situ capping of polluted seabeds in ports, harbors, and semi-enclosed coastal areas is an environmentally sound technique so long as the cap is properly placed. It is one answer to the debate of whether it is better to leave polluted sediments in place or dredge them for disposal elsewhere. It will not be applicable where channels must be maintained or deepened, nor should it be attempted where the bottom is known to be subject to occasional periods of severe turbulence. It is, however, a technique that both harbor managers and environmental managers in regulatory agencies should study for its potential to solve some difficult problems of pollution.

Special Care Measures of Dredging

Anti-turbidity overflow system for hopper dredges

It is well known that under some conditions substantial turbidity accompanies the sediment removal part of the dredging/disposal process. Studies carried out by the Japanese indicate that the sea-surface turbidity that develops during hopper dredging is due primarily to the entrainment of air bubbles in the overflow water. As they rise to the surface after discharge,the bubbles cause suspended solids to move surfaceward, not permitting them to settle rapidly to the seabed.

- The anti-turbidity system

The Japanese have developed a system, called Anti-Turbidity Overflow System (ATOS), which seems to prevent the development of surface and near-surface turbidity during hopper dredge operations. When it is severe, such turbidity is not only aesthetically displeasing but also can be harmful to the biota.

ATOS has been designed to control formation of sea-surface turbidity by (1) reducing the generation of air bubbles during the overflow process, (2) removing those air bubbles that may be formed in an early stage of the overflow process before they are discharged, and (3) discharging the air-free overflow water in such manner as to preclude any further entrainment of air.

- Advantages of ATOS

Not only does ATOS reduce unsightly surface turbidity but it also tends to decrease the areal distribution of suspended solids sent aloft by hopper dredging. It also prevents damage to sea water pumps aboard the dredger and other vessels.

Production of cakes of dehydrated dredged material for land disposal

In an attempt to provide the government with as many as possible alternative ways of eliminating toxic sediments from ports and harbors, the Japan Workvessel Association devised a method of producing relatively unpolluted cakes of dredged material that can be used to reclaim certain low-grade land areas.

It is possible to carry out the entire procedure with two vessels – a dredger and a processing barge that will convey the cakes it produces to a land transporter. There are five steps in the process:

1. Dredging
   Preference given to a pneuma pump.
2. Transport
   A pressure transfer system is used to transfer DM from the dredging head to the processing barge.
3. Dehydration
   Mechanical dehydration was selected as most practical over other methods tested.
4. Processing of separated water
   Water separated by the dehydration process contains much suspended solid and toxic materials. Before it could be discharged into the open sea, the toxic materials had to be reduced to levels at or below discharge criteria. This was accomplished by coagulator plus sand filter or tube separator plus sand filter.
   Either method reduced suspended solids to less than 10 ppm. Since the ratio of residual heavy metals to suspended solids was about 0.0001, the concentration of, say, mercury would be in the ppb range which is acceptable for discharge.
5. Unloading of the dehydrated cake to the land
   Processing barge is equipped with an extension conveyor.

Conclusions

It is accepted that the need for dredging of ports and harbors both for enlargement and maintenance of existing channels will increase in the 1980s and beyond. Further,

it is expected that some of the dredged material produced for these purposes will be polluted with Annex I substances. Noting that because ports and harbors are generally located near population centers, it is becoming increasingly difficult to find and use disposal sites on land that are themselves safe and are within reasonable hauling distances from the dredging. Experience has demonstrated that the marine environment has a high potential for assimilating dredged material without serious environmental risk, therefore it is concluded.

1) That if appropriate "special care" measures are used in disposal and in dumpsite selection, the disposing into the marine environment of dredged material containing Annex I substances would present no greater risk of environmental harm than the disposal of Annex II substances.
2) That of the several acceptable special care measures for disposing of such dredged material at sea available to the Contracting Parties, level bottom capping should be considered at this time to be a proven "special care" measure of disposal.
3) Accepting this, it is reasonable to conclude that in situ capping of polluted sediments will also prove to be an acceptable "special care" measure.
4) That although submarine pit capping may well prove to be a superior method of disposing polluted dredged material, it is concluded that it is not as yet sufficiently tested to be elevated to the status of an acceptable "special care" measure. Hence this technique for the present should be conducted as a field research project until definitive data on its environmental characteristics have been accumulated.

Recommendation

The IAPH invites the Scientific Group on Dumping to take note of the matters set forth in this submission and recommend to Contracting Parties at the Seventh Consultative Meeting that level bottom capping has been demonstrated to be a proven method for safely disposing into the marine environment of dredged material containing Annex I substances.

* * * * * *

Heavy duty paving - BPA's new manual

The British Ports Association reports a growing demand for its manual "The Structural Design of Heavy Duty Pavements for Ports and Other Industries", which is now in print.

Following pre-publication advice there has been a world wide demand for copies of the manual from a broad range of industrial interests and from ports both in the UK and overseas, and the print run has been increased in response.

The British Ports Association considers that the manual is a major contribution to engineering in the field of heavy duty paving design. It follows six years of research and development by Dr. John Knapton of Nigel Nixon and Partners, whose design methods have been successfully put into practice in many port and industrial situations in the UK and overseas. The partnership has worked closely with the British Ports Association and with civil engineers in British ports. The resulting manual is expected to become an important reference work for any engineer involved in heavy duty paving or in the selection of heavy duty mobile mechanical handling plant. It contains an explanation of design principles, an assessment of the damaging effect of mobile plant and stacked containers, worked examples and 120 design charts.

The manual will enable the engineer to proportion the courses in a heavy duty pavement more precisely, or to check the residual design life of any existing pavement, taking into account the different factors contributing to its usage and life required. Construction costs for hardstandings are, in many cases, of the order of £250,000 per hectare. By following the design considerations in the manual the cost penalty of over-designing or failure in service can be avoided.

Further details and copies of the manual may be obtained from Mr. R.A. Gibbons, British Ports Association, Commonwealth House, 1-19 New Oxford Street, London WC1A 1DZ, at a price of £75 plus postage and packing.

Panama Canal Tolls

The Panama Canal Commission has decided to put off its planned 9.8 percent toll increase originally scheduled to take effect October 1. The increase had been intended to make up for revenues the Commission believed would be lost as the result of diversion of its important Alaskan oil traffic through the trans-Isthmian pipeline, due to come online in November.

The toll question is expected to be examined by the Canal Commission's board of directors when it meets in Washington in October, and it is still possible that increases could come, although not before March, or at the earliest, February 1983.

Publications

"Sulphur: Economic, Marketing and Transportation Review and Forecast to the year 2000" by the Market Research Unit of the Marketing Branch at National Harbous Board, Canada

'A study on Sulphur: Economic, Marketing and Transportation Review and Forecast to the year 2000 is valuable in understanding present sulphur economics as well as predicting future trends. It is also important because sulphur is one of the major Canadian bulk exports shipped through the West Coast ports, particularly the Port of Vancouver, a major port within the jurisdiction of the National Harbours Board. Sulphur exports have been increasing in the past several years and this trend is expected to continue in the future. As a result, a review of port capacity is necessary in order to plan ahead to prevent port congestion and bottlenecks. This Review is also designed to assist the industry in its understanding of the sulphur market, and lead to a more efficient marketing of sulphur abroad.
—J. Auger, Vice Chairman, National Harbours Board.' *(From the Preface)*

"Existing and Potential U.S. Coal Export Loading Terminals" by Office of Port and Intermodal Development, Maritime Administration, U.S. Department of Transportation

Maritime Administration–MAR830
Office of Port & Intermodal Development
U.S. Department of Transportation
400 7th Street, S.W.
Washington, D.C. 20590, U.S.A.

"The Ports of India" (Revised third edition) by Satkartar Batra Price Rs. 75.00

'In order that ship-owners, ship masters, agents and all connected with working at the various ports in India, can have the comprehensive book, the present revised third edition of the "Ports of India" is sure to prove to be a handy reference. The book contains useful information pertaining to each and every port, where vessels call. . . . .' *(From the Introduction)*

The Kandla Commercial Publications
THX–12, ADIPUR, Kandla, India

"Optimum Dimensions of A Coal Import Terminal: The Case of Ashdod" by Prof. H.N. Wydra and Dr. Yehuda Hayuth, Israel Shipping Research Institute
65 pages, Price $25.00

'According to a recently published study, Optimum Dimensions of a Coal Import Terminal: The Case of Ashdod, the most appropriate size terminal should be able to accommodate coal carriers in the 140,000-160,000 tons deadweight range over the next decade. This conclusion was based on thorough analysis of three major factors: coal loading ports; existing coal carriers and those on order; and alternative costs of transportation in various vessel sizes. A statistical appendix of 20 tables documents these factors.

Among the major findings of the report is that, of the 33 largest coal-loading ports around the world, only 4 are currently set to handle ships of over 100,000 deadweight tons. Only 5-6 more ports will join this latter group in the second half of this decade. As for the world bulk carrier fleet, the overwhelming majority–some 87%–is made up of vessels of under 140,000 deadweight tons. The current order book, moreover, shows no change in this trend.

Economies of scale were investigated. As vessel size increases, the report states, the percentage rate of decrease in the freight rate lessens. This finding was explained by the fact that the percentage difference in size between a 60,000 D.W.T. vessel and an 80,000 D.W.T. carrier is 33%. The difference between a 180,000 D.W.T. bulker and a 200,000 D.W.T. one is only 11%. . . . The findings of the study, which effectively summarize current activity in the area of seaborne coal transport as well as forecasts of future trends and developments, are, though, applicable to port decision-makers around the world who may be in the process of contemplating the expansion of old or the initiating of new coal-import terminals.'

Israel Shipping Research Institute
P.O.B. 1860 Haifa, Israel

"Cleaner Air in Ro/Ro Cargo Spaces" by the Swedish Shipbuilding Standard Centre

'This manual provides directives for ventilation and other measures designed to control air pollution in cargo spaces on ships where motor vehicles are used for cargo handling.'

SIS–Standardiseringskommissionen i Sverige
Box 3295, S 103 66 Stockholm, Sweden

"An International Survey on Handling Iron and Steel Products" by the Technical Advisory Sub-Committee of ICHCA
60 pages, Price £30.00 (ICHCA members £20.00), air mail postage £1.80 extra

ICHCA, Abford House, 15 Wilton Road
London, SW1V 1LX, U.K.

Brazil's Ports & Waterways news in brief

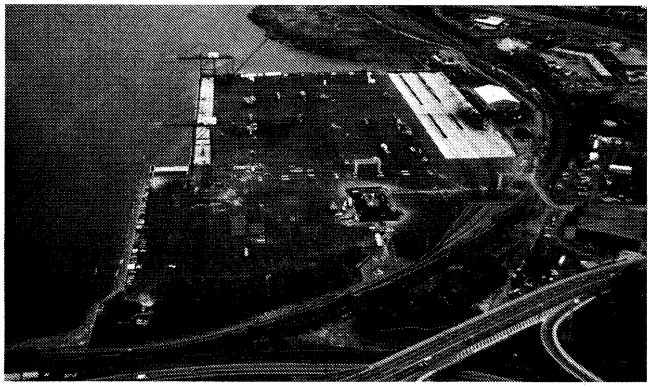
- As from the month of May coal handling in Brazil shall gain a new incentive. Portobrás is promising not only the inauguration of the Port of Sepetiba, in its phase for the handling of coal, but also the start of the first phase of the Coal Terminal of Charqueadas, at River Jacuí (Rio Grande do Sul State). The Terminal has a static capacity for 15,000 tons and is suitable to handle 1.3 million tons per year, with a possibility of exceeding this limit in the case of favorable conditions for the direct loading of coal into the barges, without previous storage.
- The discussions between the Ministry of Transports and the Interamerican Bank of Development, regarding the financing of the Program of Transport Integration at the Northeast Brazilian frontier, are now in its final stage. These resources, added to Federal funds, and resources of national shipowners and of the Merchant Marine Funds, shall make possible, in the port sector, that the ports of Porto Velho, Cáceres, Corumbá and Ladário may be used permanently, with the improvements which are being proposed.
- This year the Port of Aratu shall have priority to use the resources of Cia. Docas da Bahia. According to Codeba's President, Mário Muricy, the construction of a conventional quay in Aratu shall permit the transfer of magnesite and iron alloy, presently performed in the Port of Salvador, freeing a length of quay which shall serve to operate heavy cargo, unitized cargo and the ro-ro system, in Bahia's capital.
- The Managing Council of the Clube de Engenharia do Rio de Janeiro approved, in its first meeting in 1982, the document with the recommendations and suggestions presented at the "Week for Discussions of Inland Waterway Problems", promoted in 1981 by the Club, through its Specialized Transportation Division. Thus the document represents the official policy of the entity, in that matter. This document, recommend, within other items: the forwarding to the National Congress of a complement to Law 6,222 (which created Portobrás), creating a entity linked to the Ministry of Transports to control all activities related to inland waterways and its ports, and that a specific legislation be established for inland navigation, simplifying the procedures. *(PORTOS e NAVIOS)*

New Canadian Ports Bill enacted into law

The Ports Bill passed its third reading by the Canadian Parliament July 26 and was enacted into law. Aside from a few minor amendments, the bill remains substantially the same as reported before. Full implementation will come in September or October, or as soon as details can be worked out regarding the number of local port corporations to be created and their jurisdictions.

The aim is to give greater autonomy to local National Harbours Board ports that can meet certain criteria for national and regional significance, local interest and financial viability. In place of the National Harbours Board will be established the Canada Ports Corporation to be governed through a board of 14 directors. Also created are five regional port councils, one each for the Atlantic, Pacific, Arctic, Great Lakes and St. Lawrence regions. *(AAPAADVISORY)*

Fairview Cove Terminal opens at Port of Halifax



On July 7th 1982, several hundred invited guests representing both industry and various levels of government, joined with CERESCORP, the operators of the new Fairview Cove Terminal at the Port of Halifax, to celebrate the official opening of the newly constructed port container facility.

The first phase of the Fairview Cove Terminal presently includes 1,100 feet of berthage space, with a stern loading Ro-Ro ramp, and a minimum depth of water at the berth face of 44 feet.

The terminal is equipped with two PACECO 40 tonne capacity ship to shore gantry cranes of advanced design. Each crane has a height of 90 feet to groundlevel under the spreader, and has a maximum outreach of 125 feet.

CERESCORP uses a tractor-chassis system on the 50 acre terminal, and has equipped the facility with a PACECO (4 high) yard gantry to handle containers between chassis and storage, or between chassis and container-on-flat-car (COFC).

To facilitate high-speed handling of rail-oriented container units, 10,000 lineal feet of railway track was laid by CN RAIL. The Fairview Cove Terminal now becomes an integral part of the CN RAIL COFC system that connects the Port of Halifax with inland terminals at Montreal, Toronto, Hamilton, Windsor (Detroit) and Chicago, and is also directly connected to CN's transcontinental rail system for landbridge traffic.

The location of the Fairview Cove Terminal in sheltered Bedford Basin provides ready access to the Mackay Bridge, connecting the two cities of Halifax and Dartmouth and to the trunk highway system serving all points in the Atlantic Province of Canada.

The terminal facility also includes a consolidation shed with 25,000 sq.ft. of covered space served by rail.

The facility, owned by the National Harbours Board, was built through the joint efforts of the Governments of Canada and the Province of Nova Scotia who contributed $29 million and $6.5 million respectively. CERESCORP, the operators, have invested $13 million in equipping the new Port of Halifax container terminal.

At the official opening, Bryce Fisher, general manager of CERESCORP stated "the terminal was constructed with expansion in mind, and will eventually comprise 3,000 lineal feet of dock space, allowing for 3 berths in the deepest water of any east coast north American port."

Chris N. Kritikos, president of CERES terminals, parent of CERESCORP, said he expects the Fairview Cove Terminal to be profitable by the end of 1983, and to be making a significant contribution to Port of Halifax container tonnage at that time.

The terminal presently handles Polish Ocean Lines', North Atlantic Con-Ro Service, and Baltatlantic Lines. CERESCORP is now actively negotiating with other potential customers who Mr. Kritikos declined to identify.

What is the future for Nanaimo's Waterfront ?

A few weeks ago Nanaimo Waterfront Proposal was put before the public through meetings, press and radio.

The copy of the Nanaimo Waterfront Proposal is worthy of more than a casual glance. Coming at a time when current economic conditions are at a low ebb and a general feeling of apprehension about the future seems to be prevalent, promotion of such a bold and imaginative concept is, to say the least, unique.

The ideas expressed in the Proposal are of interest not only to Nanaimo residents but to people living in other seaports who wonder what the future holds for their chosen area. To put forward the Proposal at this time when such terms as restraint, depression and lack of funds have replaced growth and development, real estate boom and others used so frequently until lately, seems at first to be inappropriate.

On the other hand it actually is exactly the right time. Nanaimo Harbour Commission by setting out this proposal introduces a buoyant optimistic note to the community at a time when such an approach is most needed.

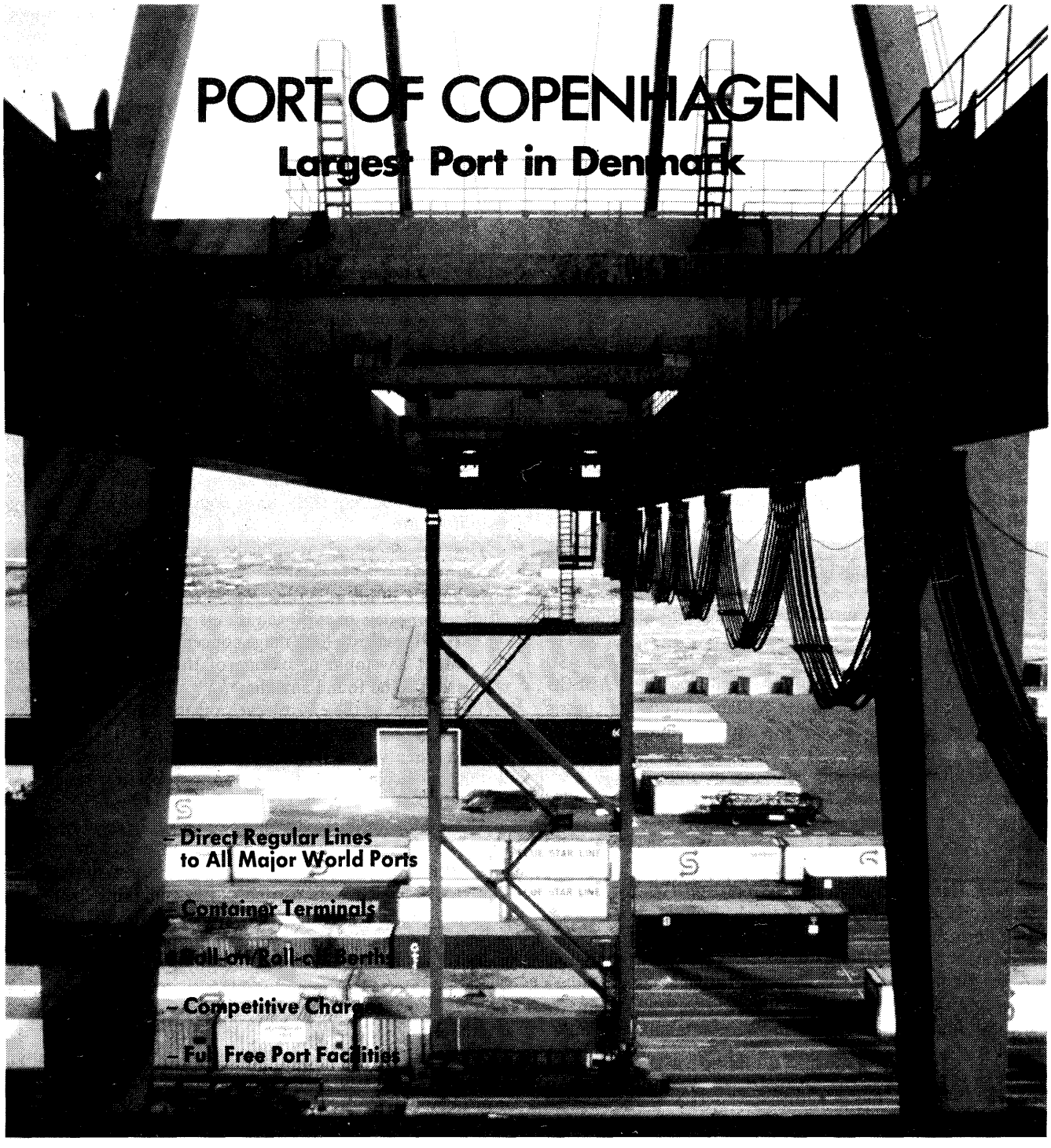
The Proposal is a long range concept. It offers guidelines for overall development of one of the finest stretches of waterfront to be found anywhere.

Realization of the entire development plan may be many years away, but the point is, there now exists for the first time, a direction in which to go, one that will achieve a waterfront which makes the best use of this stretch of shoreline.

Having the waterfront concept as a guidepost hopefully will stimulate both the private and public sectors toward implementation of some of the ideas expressed in the plan. The studies which were carried out in compiling the report for the Proposal provide the information for the practical approach to starting development.

Reaction to the waterfront scheme so far has been very favorable. Organization and individuals have indicated they like the general concept. The idea of a people oriented waterfront appeals to many residents and visitors.

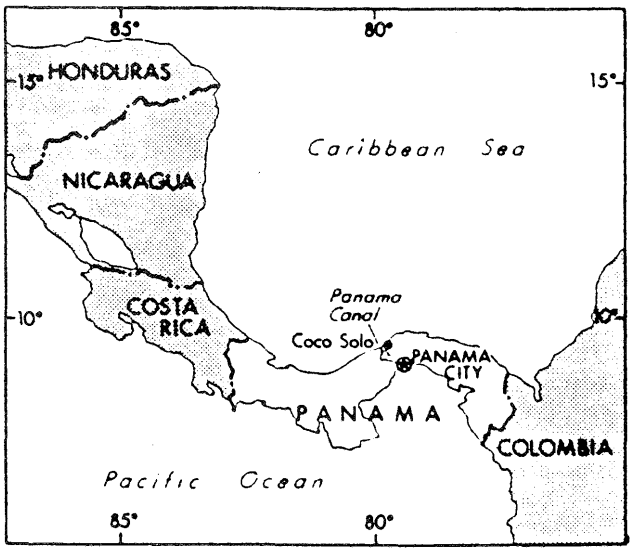
Nanaimo Harbour Commission has taken the initiative and provided the opportunity. Let's hope the opportunity is not ignored. *(Nanaimo Harbour News)*



PORT OF COPENHAGEN AUTHORITY

Nordre Toldbod 7 DK 1259 Copenhagen K.

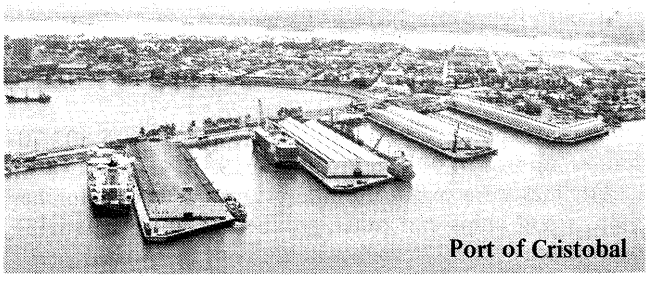
Master plan for port development (1981-1985): Autoridad Portuaria Nacional, Panama



Port of Cristobal—Containers Terminal

Panamá will invest over US$64 million in the terminal ports of the Canal in order to augment its role in international maritime commerce, helped by its interoceanic waterway, to gain optimun benefits from its geographical location. The improvement and expansion plan of the ports services will be financed, in part, by a loan of US$10 million granted by the Industrial Bank of Japan for the Container Terminal and by US$24.4 million for port improvements planned for the Second Port Program financed by the World Bank according to the Director of the National Port Authority, Mayor Aristides Valdonedo.

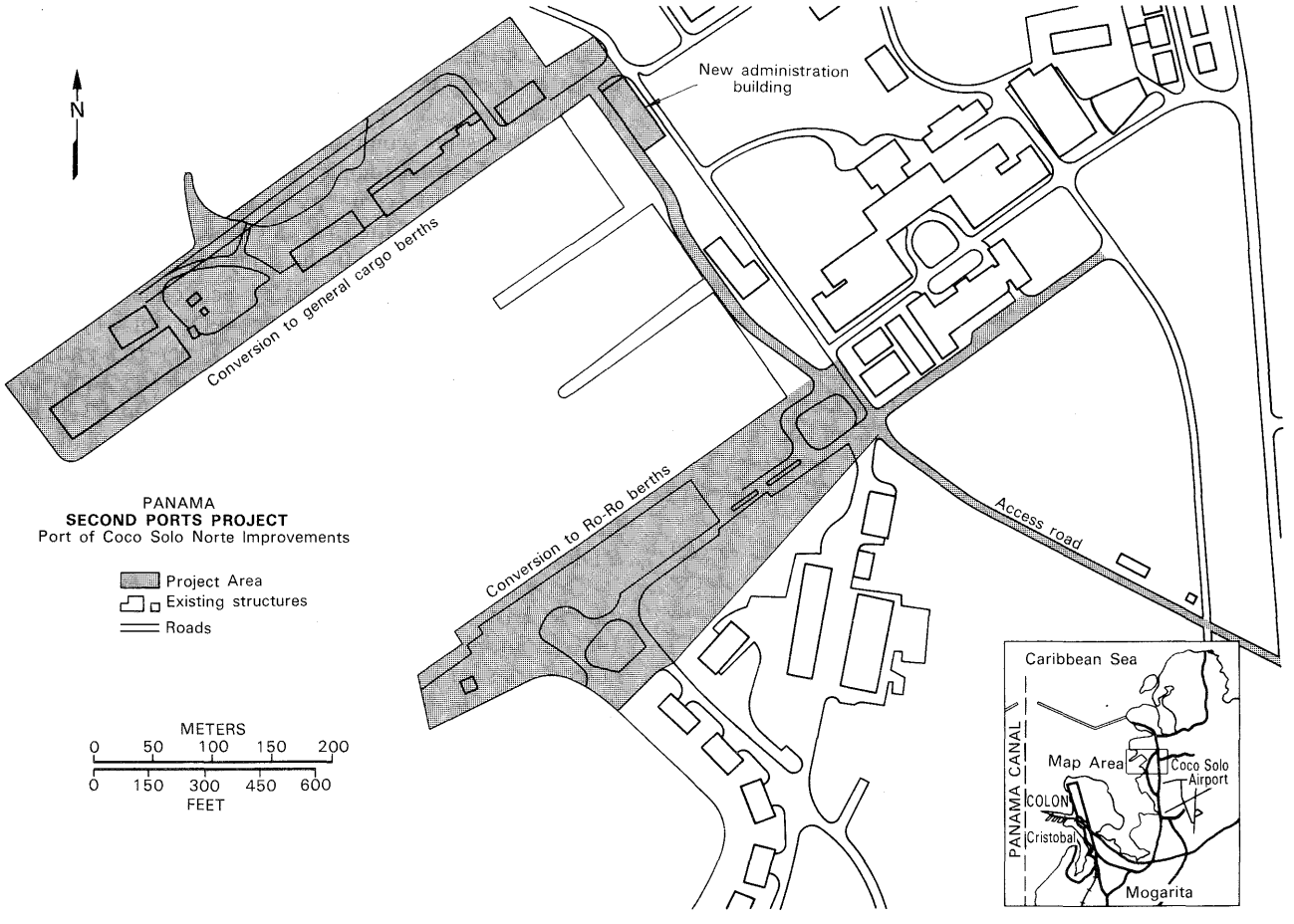
The grand total of this investment, approximately US$48.2 million will be absorbed by the Port of Cristobal, which will be provided container cranes and with the necessary infrastructure so that it can efficiently fulfill its function of a first class container port.


Port of Cristobal

Coco Solo Norte

The National Port Authority has programmed an investment of US$5.5 million for the pier of Coco Solo Norte close to Cristobal to service ro/ro ships and to improve 2.6 hectares (6.4 acres) for containers storage as well as for general cargo.

The improvements include lighting installations, bunkering systems and dredging of the port and its approaches.



At halfway point, new tonnage record in sight: Port of Vancouver

The Port of Vancouver, which set a new tonnage handling record last year, is on the way to breaking it in 1982 despite the depressed world economic conditions.

Statistics for the first half of this year show Port activity running four per cent higher than a year ago. After six months the Port has handled 25,867,780 tonnes of cargo, compared with 24,838,325 in the same period last year.

Port authorities say there is a good chance that 1982 tonnage will exceed the 50 million tonnes target they had set for this year.

During 1981, when many world ports were reporting less business, the Port of Vancouver moved a record 49,495,000 metric tonnes of freight, 0.5% above the previous record year of 1980.

A continuing increase in coal exports contributes substantially to the relatively bright picture. Coal exports in the first half of 1982 reached 8,163,869 tonnes. Last year's six-month figure was 7,528,815 tonnes.

Mineral cargoes, including potash, base metals, concentrates and salt, totalled 10,848,467 tonnes, compared with 10,439,474 in 1981.

Grain exports were also higher, reaching 5,802,704 tonnes, up from 4,906,560 tonnes in 1981.

Declines were registered in forest products, with lumber, pulp, wood chips and other products totalling 2,935,481, down from 3,210,275 tonnes in the same period last year.

Petroleum products, including sulphur, oil, gas, propane and petrochemicals, were about the same. They accounted for 4,514,478 tonnes in the first six months of 1982, compared with 4,561,348 a year ago.

Port of Baltimore worth $1 billion ... and a lot more

Trade and commerce through the port of Baltimore generated $1.2 billion in revenues and employment for 79,000 Marylanders in 1980, according to an economic impact study prepared by Booz-Allen & Hamilton, Inc., an internationally reknown consultant firm.

In addition, the study says another $52 million in state and local taxes was generated by port activity, as was $9 million in Maryland state sales taxes, $2.4 million in vehicle registration fees, $1 million in fuel tax revenues. $5.7 million in state corporate taxes, and about $3.2 million in property taxes.

"The port of Baltimore represents Maryland's largest industry and its most valuable resource," the study states. This value, the study says, should be taken into account "when considering the allocation" of future state financial resources for port development.

The $70,000-study, entitled "The Economic Impact of the Port of Baltimore," was commissioned by the Greater Baltimore Committee, Inc., in conjunction with the Maryland Port Administration, the Steamship Trade Association of Baltimore, the Maryland Chamber of Commerce, and the Maryland Pilots Association. The statistics are based on 1980 figures.

"The study again confirms the long-standing conviction that the port of Baltimore is Maryland's single most important economic asset," says W. Gregory Halpin, Maryland Port Administrator. "The community of interest among port people here plus the great diversity of cargo and facilities, and the ongoing support of state and city governments, have created the healthy climate necessary for the port to flourish and expand."

Total revenues for organizations involved with commercial port activity—including federal, state and local agencies as well as the private sector—amounted to $1.2 billion in 1980, according to the study. Rail and trucking firms received $475 million or 40 percent of the total revenue due to port activity. Maritime service firms received $429 million or 36 percent of the total revenue while the banking and insurance sector received $19 million or 2 percent of the total. The federal government received $260 million or 22 percent of the total revenue through customs collections, the study states.

The study says that 79,000 Maryland residents, or 4 percent of the state's total work force, were employed by organizations related to the port of Baltimore. Of the 79,000 jobs, some 23,783 were directly generated by port activity at Baltimore with 80 percent of them being held by residents of Baltimore City and Baltimore County. An additional 30,000 out-of-state jobs were created as a result of port of Baltimore trade and commerce, the study says.

Nearly 60 percent of the employment generated by activities at the port of Baltimore was related to general cargo handling. More than $1 billion in wages were paid annually to employees working for Maryland firms doing business in the port.

Containerized cargo generated 37 percent of the total revenue at the port of Baltimore in 1980, according to the study, Containerized cargo, automobiles and other general cargo were responsible for generating about 56 percent of the Maryland jobs resulting directly from port activity, while these same commodities represented less than 15 percent of the total tonnage handled by the port of Baltimore. In contrast, coal and grain were responsible for about 24 percent of the jobs and more than 40 percent of total port tonnage in 1980, the study states.

Containerized cargo generated economic revenues of $72.34 per ton, automobiles accounted for $174.85 per ton, grain exports produced $20.97 per ton and other general cargo brought $92 per ton in 1980, the study says.

The Maryland Port Administration received $24 million in revenues from terminal leases, wharfage and dockage charges in 1980. The Maryland Port Administration also received $2 million from rentals at the World Trade Center Baltimore and another $1 million from other assorted services, the study states.

The port of Baltimore, the second largest container port on the East Coast, handled 38,169,000 tons of cargo in 1980. Some 4.6 million tons of container cargo and 12.7 million tons of coal moved through the port during the year. *(Port of Baltimore)*

New Dundalk berth nearing completion : Maryland Port Administration

BERTH 13, a new 1,000-foot bulk-head being built at the Dundalk Marine Terminal, will add at least 750,000 tons to the port of Baltimore's annual cargo capacity according to the Maryland Port Administration. This will increase Dundalk's yearly throughput in container cargo by 3.5 million tons, a 27 percent jump over current tonnage levels.

The berth is scheduled to open this September at a cost of $35 million. When it does, together with cranes, dredging and storage acreage, it will be the largest and most expensive development project in the history of the MPA.

Berth 13 is being built as an extension of berths 11 and 12 to form a continuous bulkhead ending in a roll-on, roll-off platform at the southeast corner of the 550-acre Dundalk terminal, the port of Baltimore's largest general cargo handling facility. The length of the berth will be 1,050 feet from the center line of Twelfth Street to the edge of the RO/RO platform. Actual construction will include 963 feet of new bulkhead attached to a section built previously in 1971.

The terminal has 521,000 square feet of covered storage plus two 65,000 square foot and one 62,500 square foot consolidation sheds. Dundalk connects with Chessie System, Canton Railroad and ConRail. Road access to highways is possible via Broening Highway to Interstate-695 and the Francis Scott Key Memorial Bridge.

Cargo handled at the Dundalk Marine Terminal during the first quarter of this year reached 962,455 tons, a 7.9 percent increase over the same period of 1981. *(Port of Baltimore)*

Massport cosponsoring 1982 Fall Conference & Shippers Dialogue

The Massachusetts Port Authority will join the Containerization and Intermodal Institute in cosponsoring the 1982 Fall Conference and Shippers Dialogue, October 6-7 at Anthony's Pier Four, Boston.

The Conference theme will be "The Future Role of Regional Ports", and it will involve a range of maritime commercial interests—shippers, freight forwarders, NVO's, intermodal operators, and government agencies—as participants.

Massport's Executive Director, David W. Davis notes, "This is the first event of its kind to be held in Boston, and it is designed to be of special interest to New England shippers and freight forwarders who use the Port of Boston."

Massport's Port Director, Martin C. Pilsch, Jr., Chairman of the Conference, and Manager of Maritime Sales, Francis J. Sheehan are developing the program with C & II Chairman, Donald Chakas, President, J.C. Jessen, and Executive Director, Norman Stone.

Long Beach coal project on schedule

Long Beach's International Coal Project is proceeding on schedule and turnkey construction specifications will be ready to go to bid in October, 1982, according to an announcement by the facility's executive committee.

The committee, representing the Port, Upland Industries, C. Itoh Company, Metropolitan Stevedore Company and Crowley Maritime Corporation, at the same time has authorized an additional expenditure of $1,200,000 to complete turnkey specifications, do additional soil work and to obtain all necessary environmental permits prior to March 1, 1983.

It is anticipated that bids will be received in February 1983, with contracts to be let and construction of the massive export terminal on the north bank of Cerritos Channel in the Long Beach inner harbor to begin in 1983.

Water depth at the 1,000-foot long berth will be capable of handling 150,000 ton vessels when the initial phase is completed in 1985. The facility will have throughput of 15 million tons of coal annually.

New president and vice-president : Port of Los Angeles Board

Mrs. Gene Kaplan and Joseph J. Zaninovich have been elected president and vice president, respectively, of the Los Angeles Board of Harbor Commissioners. Kaplan becomes the first woman president in the 75-year history of the Harbor Commission.

Since her original appointment to the Board in 1974, she has served two terms as vice president.

Zaninovich has been a member of the Board for just over one year. He was formerly corporate director of industrial relations for the Terminal Island based Star-Kist Foods, Inc. and is a native of Yugoslavia.

Zaninovich and his wife Vesna have resided in San Pedro since 1938. He was active on the City's Parking and Transportation Commissions prior to his Harbor Commission selection in 1981.

Eng elected President of Oakland Board of Port Commissioners

Herbert Eng, an Oakland Chinatown community leader, was recently elected President of the Oakland Board of Port Commissioners.

Eng succeeds Norvel Smith, a distinguished Bay Area educator, who served as Board President during the 1981-82 fiscal year.

Eng has been a member of the Board of Port Commissioners since July 19, 1979. He served as 1st Vice President of the Board during the 1981-82 fiscal year.

Pan-Pacific Trade and Transport Conference : Port of Oakland

Ambassador William E. Brock will be the keynote speaker at the Pan-Pacific Trade and Transport Conference in Oakland, California, October 19-21.

The conference, sponsored by the Port of Oakland and the Port of Yokohama, includes both the sixth annual International Transportation Conference and a day-long seminar dealing with Sister Port Programs.

Ambassador Brock is the United States Trade Representative, with Cabinet rank, and the President's chief trade advisor and international trade negotiator.

Title of his keynote address is: "The State of the World's Economy and Trade Potential."

The conference will present an opportunity for a cross-fertilization of viewpoints on issues of vital importance to the trade and transportation community. Participants will include some of the most knowledgeable and respected industry leaders in the world.

The conference theme is "Trans-Pacific Trade:—Expansion Ahead."

Discussions will focus on the following topics:

- Review of the world's economic climate and trade potential
- Trade expansion opportunities in the 1980s
- Developments affecting United States liner trade
- A status report on U.S. maritime policy
- Perspectives on U.S. trade with Japan, Korea, Taiwan, Philippines, Australia and New Zealand.

The Far East is the Port of Oakland's largest regional trading partner in both imports and exports.

Substantial increase in trade in the Pacific Basin have been forecast.

The first transportation conference was held in the Fall of 1976, focusing on the impact of containerisation on surface and ocean transport. Successive conferences have included such topics as world market opportunities, U.S. and international maritime reform, and shippers' and carriers' practices in a deregulated environment.

Port of Tacoma cold storage automation

Loading docks with Kelly ramps can accommodate six trucks loading simultaneously.

Port of Tacoma's cold storage facility located at Terminal 2 is Port owned and operated. The facility is 2 million cubic feet and can hold 8,000 tons or 16,000,000 lbs. of cargo. It has averaged over 30,000 tons of cargo per year for the past four years with an average import value in excess of $50 million per year. Recent estimates indicate that 95% of the frozen meat imported via water to Puget Sound enter through Tacoma for distribution throughout the U.S.

Port of Tacoma just completed a $179,800 project to automate cold storage equipment. Two of the five original compressors were changed with new, modern units and a system of sensors was installed at key points throughout the facility to allow continued monitoring of temperatures in the various freeze rooms. Automatic controls on the compressor units themselves were added with alarm system that not only would sense a problem in the equipment, but would shut down a faulty system if that should occur. The installation is resulting in more efficient operation and allows improved temperature control in all areas of the facility.

Tacoma's Cold Storage facility offers a full range of services, and efforts are continually being made to implement programs to improve service and methods of handling cargo. A trained staff directs cargoes to destinations through close coordination with brokers/customers. Inventory control, receiving and deliveries are expeditiously handled by computer and the customer and/or importer is mailed notification the same day product is released. A feature of service to customers is seven days of free time in the cold storage warehouse, placing the frozen cargo shipper in a similar position as the dry cargo shipper in this respect. Excellence in service and customer satisfaction are what Tacoma is striving to maintain.

Antwerp Port news

New LPG terminal to be built at left Scheldt bank

The Flemish executive committee approved of an investment by Antwerp Gas Terminal of 1,750 million BF for the construction of a new LPG terminal on the left Scheldt bank.

The installation includes 24,000 m^3 storage space for LPG under pressure and another 100,000 m^3 for cooled LPG. With 5 refillings per year this means an annual traffic of 620,000 m^3 LPG.

The building of the terminal will take two years and provide additional work for 200 people.

100 containers unloaded in 2 hours.

The Antwerp Stevedoring Company "Antigoon" succeeded in unloading 100 containers in 2 hours of time.

The containers were discharged from the German freighter "Hermann Wesch", operated within the framework of the E.A.L.-service.

By using a new container spreader, coupled to a mobile Gottwald crane, a high productivity level of 50 containers an hour could be reached. The spreader, constructed by Peiner from West Germany, is equipped with 6 bars, operated by the crane driver via remote control. The system allows to speed up considerably loading and unloading operations of containers.

New record draft

The Greek bulk carrier "Filiatra Legacy" established a new record draft upon arrival in Antwerp.

When entering the Zandvliet lock she drew 47'9".

M.S. Filiatra Legacy carried 92,179 tons of iron ore pellets, originating from Point Ubu (Brazil) and bound for the Antwerp handling company Stocatra.

The 117,893 tdw Greek vessel—264 m long—sailed under time-charter for the Antwerp Cobelfret group.

C.M.B. is constructing a new container terminal in Antwerp

At present Compagnie Maritime Belge (C.M.B.) is building a new container terminal on its concession at the Leopold Dock.

The new terminal will have a berthing length of 450 m and a quay width of 320 m. It will be equipped with 2 container gantries, each with a lifting capacity of 45 tons, as well as with all rolling material needed for handling containers. In a first phase an investment of 350 million B.F. is involved. The terminal will be in operation before the end of the year.

Safety in the Port of Antwerp

By J. Gervais

In every port numerous accidents occur while ships, barges, railway wagons, lorries and containers are being loaded and unloaded and goods stored prior to being sent on. These accidents are mainly due to the labour-intensive nature of port work and to the typical working conditions characteristic of port operations. A specific characteristic of work in the port of Antwerp is the lack of a permanent relation between the cargo-handling firm and the dockers who are taken on for each job. According to Professor Karel van Isacker in his book "Afscheid van de Havenarbeider" (Good-bye to the Docker), in the first ten years after the Second World War twenty five fatal accidents occurred every year and the number of non-fatal accidents varied between six and seven thousand. Today, after some 25 years of preventive work by the Joint Committee and the Joint Service for Safety and Hygiene in the Port of Antwerp these figures have dropped sharply and the figures for the frequency and seriousness of accidents continue to show a downward trend. This is an extra incentive to continue the work already begun and to strive for ideally safe working conditions.

Accident prevention: a must

For every victim an accident means physical and moral suffering. In addition in cases of permanent invalidity there is a risk of psychologically harmful consequences as a result of which the docker suffers for the rest of his life from the consequences of the accident. For his family too this means moral and psychological suffering in addition to medical and family worries. From the social point of view it is thus necessary to prevent accidents as much as possible. Besides this, the Port of Antwerp has its international reputation based on its high efficiency and professional skills to maintain. At the competitive level there is every reason to ensure rapid and smooth cargo handling. However, as the result of an accident the labour process is temporarily interrupted, which without any doubt involves losses.

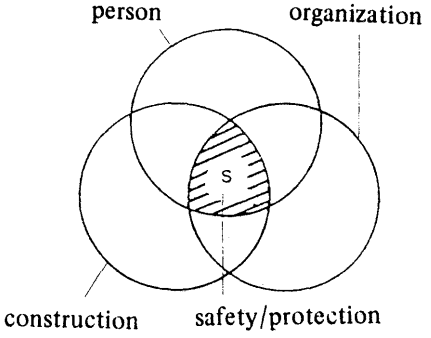
Moreover, there is a clear correlation between the number of accidents involving physical injuries and those involving material damage. The prevention of accidents is thus also an economic necessity.

However, an accident is seldom the result of one single cause but rather originates in a system which forms the situation in which the accident occurs. The elements or factors which are or could be the cause of an accident may, according to Professor Compess, be divided into three categories:

1. the construction (C): this includes everything involving the material and technical aspect of a system, namely the design, production and use of technical and material equipment and so on, in which a further differentiation can be made between the mechanical, chemical, constructional aspects, etc.;
2. the person (P): this means the man in the system, both individuals and groups. Personal factors thus refer to individual or collective behavioural patterns and actions as well as to social or sociological factors. Human actions can in such cases be active or passive;
3. the organization (O): this is the structure in which the system exists. It includes operating machinery, working methods, regulations, etc.

These three complexes of effective factors can be represented by three circles. However, they are not each separately responsible for safety or for an accident as they together form in their mutual relations the situation in the system which is safe or which engenders an accident. If only one of the three complexes (C, P or O) is taken into consideration and acted upon, incomplete and one-sided solutions will be obtained.

The figure below shows that safety or protection (area S) can only be realized where the three factors C, P and O coincide: if the three areas of C, P and O do not overlap, the worst possible situations arises; the greater the overlap, the greater the common area S and hence the greater the safety.



Constructional-technical, personal and organizational elements are thus the three main elements of safety and to achieve the latter it is necessary to achieve a suitable combination of all three factors C, P and O.

The safety policy of the Joint Service for Safety and Hygiene in the Port of Antwerp from the very beginning has been broadly aimed at

- improving technical equipment;
- motivating both employers and employees;
- improving working methods.

However, to differentiate between these categories is difficult because the means used mostly act in all three areas at once. In order to make a differentiation the direct aim of the campaign, namely "Safe work is efficient work, efficient work is safe work", is taken as a starting point. Because it would take us too far to deal with all of the campaigns of the Joint Service for Safety and Hygiene only a few points are examined in brief.

Methods aimed at improving technical equipment

Although most accidents are neither the result of a mechanical defect nor of a lack of the appropriate aids, all firms are visited and in cooperation with the work representatives for safety and hygiene constructional and technical improvements are made where possible. In many cases this also leads to increased productivity. The "Prevention Policy" has played an important role in this field.

Copies of the inspection reports of lifting and slinging

material issued by the recognized bodies are checked and followed up by the Joint Service for Safety and Hygiene. At the same time at the request of the Joint Committee the City of Antwerp has introduced the obligation of having all port vehicles inspected annually by a recognized body.

As far as slinging material and flexible bulk cargo containers are concerned, regulations have been drawn up which suppliers must adhere to if they wish to make deliveries in the port and which enable dockworkers to see at once and on the site what the maximum permitted safe working load is and what the safe method of slinging is.

Methods aimed at motivation

Employers are principally motivated by means of circulars, personal letters and contacts with the head of the Service of Safety and Hygiene and its engineers.

These contacts reveal a growing change in the employers' mentality and the original suspicion with regard to the Service has evolved into a form of mutual cooperation in which the focus is placed on safety and as a result the regulations and recommendations which have been brought together in the "Vademecum voor veiligheid en hygiëne voor de ondernemingen van goederenbehandeling aan de haven van Antwerpen" (Guide to Safety and Hygiene for Cargo-handling Films in the Port of Antwerp) are adhered to as closely as possible.

It is, however, more difficult to reach the dockworkers and to inculcate a positive attitude with regard to their safety. This is mostly done by the advice which the six permanent representatives of the Service for Safety and Hygiene – all ex-dockers – give during their daily conversations with dockers at the place they are working. The success of this approach cannot be translated into statistical data and depends mainly upon the degree to which the dockworkers accept the permanent representatives as belonging to the same group as themselves.

In November 1980 a start was also made on a training centre for dockworkers at which an attempt is made not merely to teach trainee dockers the correct and safe methods for handling various types of cargo but also to motivate them with regard to their own personal safety and that of their fellow-workers.

Methods aimed at improving working procedures

Both employers and leading managers on the one hand and executives and dockworkers on the other are involved in the improvement of working methods. However, in order to obtain a positive result it is necessary to ensure the adoption of safe working procedures by both groups. For this reason an attempt is made to evaluate each new technique which is introduced and each new form of packing which makes its appearance and to take the appropriate steps.

For work with recipients containing dangerous products a system has been worked out whereby all necessary information and assistance can be obtained from the Service for Safety and Hygiene and the necessary protective equipment can be obtained from the central SIHWA aid-post at quay 142. This also applies to repairing or repacking damaged recipients.

The aim which the Joint Service for Safety and Hygiene has set itself is the prevention of an undesired harmful coincidence of potential dangers and potential victims, or at least the reduction of the harmful effects to a minimum. An attempt is made to avoid the danger from the very start and, if this is not possible, to remove or isolate the existing danger as quickly as possible.

It is nevertheless a fact that in a labour-intensive sector, such as the port undoubtedly is, the chance of an accident cannot be completely eliminated. Safety is, however, a philosophy, a way of life, a form of consciousness, and this is increasingly being recognized in Antwerp port circles. Eventually this will lead to even less accidents entailing physical injury and/or material damage. *(HINTERLAND)*

Local MP inaugurates £1½ million container terminal at Garston, Liverpool

The British Transport Docks Board's newly completed North Dock Container Terminal at Garston, Liverpool, was inaugurated by the local Member of Parliament, Mr. Malcolm Thornton.

The development, completed at a cost of £1½ million, will allow for further growth of the established shipping services linking Garston with Belfast, Dublin, Le Havre and Lisbon. The port already handles over 60,000 container units (TEUs) per year.

The North Dock Terminal is owned by the BTDB and operated by the Irish-based transport company Coastal Container Services Limited. It is equipped with two Liebherr 35-tonne quayside cranes, and has two berths providing 1,000 ft. of quayside. Back-up facilities include a new 6 acre compound for the storage and stacking of containers, and a Freightliner terminal.

Speaking at the inauguration ceremony, Mr. Thornton said: 'Garston's excellent record of growth and profitability shows what Britain can achieve when management and workforce pull together.' Garston's trade increased by 250,000 tonnes in 1981 and profits increased from £429,000 to £569,000. In the first six months of 1982, traffic rose by 62% compared with the same period last year.

Mr. Thornton planted a tree as part of the opening ceremony. The port lies in a mixed residential/industrial area, and the BTDB are siting trees to screen port operations from local residents.

The Docks Board's Chairman, Keith Stuart, said that Garston's growth had now put it in the 'Top Ten' of British container ports. The £1½ million investment, he said,

reflected the Board's policy of ploughing profits back into the business.

The British Transport Docks Board is due to be 'privatised' in the near future. Under this scheme Garston will remain part of the 19-port group, which will change its name to Associated British Ports as part of the privatisation process.

Esbjerg Harbour expansion

Demand for new sites for offshore and other activities in Esbjerg's harbour area will mean increasing the land area by 50,000 square metres this year and a further 350,000 square metres during the next few years.

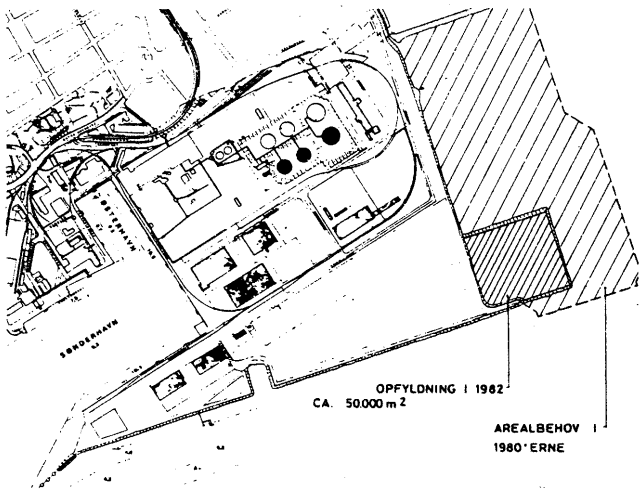
Esbjerg is in the happy position—in theory, at least, as all expansions cost money—of being able to add new land to the port area for a long time to come, simply by keeping the dredgers moving down the coast.

Industrial sites

While the port administration, which is state operated, goes ahead with its plans, the city of Esbjerg is working on tentative plans to add new industrial sites roughly parallel to the port extension.

"We've got lots of industrial sites away from the harbour," said Esbjerg's business manager K.E. Petersen, who heads the city's offshore committee, "but everyone want to be down near the waterfront. So we're going to take a close look at these sites in the Måde area."

Esbjerg is also in the happy position, said Petersen, of having a close working relationship with the port administration, which is controlled by the Ministry for Industry in Copenhagen.



Shaded area shows new reclamation during 1982. Larger area with heavier line is the foreseen land requirement during the 1980s.

New Fruit Terminal with throughput capacity of 200,000 tonnes a year (Ist phase) : Port of Le Havre

- Jean Reinhart Wharf:
  Sheds 44 - 45 - 46.
  Surface area: 60,000 sq m/645,000 sq ft.
- Berthing capacity:
  5 berths (including the Brazil Wharf) with a total of 1,000 m/3,280 ft of waterfront.
  Accessible to the most modern specialised fruit carriers (drawing from 8.30 m to 10.70 m/27 ft to 35 ft).
- Equipment:
  – Handling equipment:
    - 6 x 10-tonne cranes
    - 3 x 3-tonne cranes
  – Storage areas (1st phase):
    - 20,000 sq m/215,000 sq ft of fully insulated covered space, including:
    - 1,410 sq m/15,000 sq ft of air-conditioned space with cubicles and a controlled temperature range of 0° to 13°C (32° to 55°F), regardless of the outside temperature,
    - 3,620 sq m/39,000 sq ft of space with a controlled temperature range of 4° to 13°C (39° to 55°F),
    - 15,000 sq m/161,000 sq ft of ventilated and insulated space.
  – Possibility of future extension to 40,000 sq m/430,000 sq ft.
- Miscellaneous equipment:
  – quayside with three railway tracks,
  – raised loading bays with two railway tracks,
  – open storage areas with one railway track,
  – facilities specially designed for the loading of lorries and railway trucks,
  – nearby car and lorry parks for both goods and staff.
- A few technical details:
  The unit coolers spread through the different storage areas have variable speed ventilators, so that cooling can be maintained without discomfort to the labour force.
  To provide as dependable a system as possible over the considerable distances involved, it was decided to use a glycol/water solution as the cooling/heating liquid in the storage areas. It is brought to the desired temperature by a glycol/freon exchanger.
  The actual cooling of the air is brought about by two 700,000 fg/h screw compressors, which, if one group breaks down, can still provide 66% of the power theoretically required.
  The condensers are cooled by seawater pumped in from the dock.
  The whole system is fully automated and was designed for maximum dependability, with a central monitoring and control unit, the duplication of all vital parts and the option of switching to manual operation.

Bremen and Bremerhaven news

1983 Europe's No. 1 container terminal

On 10th September 1982 the first ship will berth at the newest section of the, then, 1,835-metre long Bremerhaven container quay, which will be extended by a further 315 metres, to 2,150 kilometres, at the beginning of 1983—to so become the world's longest fully-equipped ocean-vessel cargo-handling installation.

This giant quay belongs to the, as from 1983, also largest container-terminal in Europe, with its, then, 18 container-bridges, containoveyors and all the specialised equipment, with the already, several-times, extended storage areas and the constantly increasing large halls and sheds. Furthermore attention is already being given to a further doubling

of same over the long term. Already, now, relative areals are preparatorilly being reclaimed.

Bremerhaven way ahead

There prevails here, not without reason and despite a worldwide depressive maritime economy, a 'Hanseatically reserved and cautious optimism'. Ocean-cargo handling for the Bremen ports in the first five months of 1982 lay 15.4% over that of the same period in 1981—even 15.8% in Bremerhaven.

6.5 million containers handled since 1966

A prudent ports policy is bearing fruit. The Bremen ports were, worldwide among the first to take up container-traffic with the USA. The "Fairland" of Sea-Land Inc, was the first containership to discharge in Europe here already on 5th May 1966.

Since then more than one million containers have been handled in the Bremen ports from Sea-Land alone; in all 6.5 million of these standard tin boxes (20'-basis). Sea-Land today: "Bremerhaven is the best container handling place in the world". Meanwhile ten Atlantic fully-containerised services connect the USA with West-Germany. They all serve practically only one German port:—Bremerhaven.

PMA moves to World Trade Centre

All Head Office departments of the Port of Melbourne Authority moved to the Port Authority Building in the World Trade Centre on Monday 21 June.

The 12-storey Port Authority Building is the first of the Trade Centre's five buildings to be completed. Two more buildings are scheduled to be ready for occupation by the end of the year with the remaining two structures becoming available early in 1983.

Scheduled completion date for the Galleria is April 1983, and bookings have already been taken for a number of trade display to be staged there from mid-1983.

Months of careful planning went into the move of the 260 Head Office staff from the Market Street building, occupied by the PMA for fifty years, to the World Trade Centre.

Following the move of the Port of Melbourne Authority to the World Trade Centre the postal address and Head Office telephone number have been changed.

POSTAL ADDRESS
P.O. Box 4721, Melbourne, 3001
TELEPHONE 611 1777

PSA Seminars for Ports and Shipping Executives — 10 January to 28 January 1983 —

The Port of Singapore Authority in conjunction with Ernst G. Frankel, Professor of Ocean Systems, Massachusetts Institute of Technology will be organising the following three seminars, each of which, will be a week in duration:—

Port Management and Operations
(10.1.83–14.1.83)

Port Planning and Development
(17.1.83–21.1.83)

Shipping Management and Operations
(24.1.83–28.1.83)

Objectives & Methodology

These seminars will provide port managers, operators, planners and shipping executives with an in-depth knowledge of the latest concepts, techniques and developments in the field of port management, operations, planning and shipping. Presentation techniques will include formal lectures, case studies and panel discussions.

Main Speakers
Professor Ernst G Frankel—Seminar Director

Ernst G Frankel, Professor of Ocean Systems, Massachusetts Institute of Technology, is the Director for the three seminars. He has provided consultancy services on port management, operations and engineering to some 50 major ports of the world and has been responsible for the design of numerous container and bulk terminals as well as navigational channels. He is the author of over 70 papers, 120 reports, various specialised port computer programmes and 3 books on "Port Management and Planning".

Professor Per Bruun

Professor Bruun is a renowned Port Engineer and the former Head of the Department of Port Engineering, University of Trondheim, Norway. He has had over 35 years of worldwide experience in port design and engineering and has been responsible for numerous break-water, pier, and other port and coastal engineering projects. He is the author of over 100 papers and 6 books including an authoritative work on "Port Engineering".

Professor Philipe Wilmes

Professor Wilmes is the Dean of the School of Administration and Management, University of Louvain, Belgium. He is an authority on management information systems and administration structures. He has served as a Consultant on management information systems to some of the world's major ports and shipping organisations.

Mr. Pedro Taborga

Mr. Taborga, a graduate of the Massachusetts Institute of Technology, is an eminent shipping and port economist in the Transport Project Department of the World Bank, Washington D.C. Prior to joining the World Bank, he served as a Shipping Executive with major United States and Chilean Shipping organisations.

Port Management and Operations

- Changing functions of ports
- Port traffic forecasting
- Port organisation and management
- Strategic planning methods
- Port financing and budgeting
- Port investment criteria and sources of finance
- Port regulations and policies
- Port pricing and tariff structure
- Port economics
- Port project design, evaluation and management
- Port development
- Use of computers in port management and operation
- Resource allocation and operational control methods

Port Planning and Development

- Port planning
- Port technology development
- Port siting analysis
- Design of surveys for port and channel development
- Design of port approaches and vessel traffic systems
- Role of simulators
- Port and terminal layout design
- Effective methods for equipment selection
- Break-water design
- Port structures
- Container Terminal development
- Port environmental impact assessment

Shipping Management and Operations

- Role of shipping
- Organisation of shipping
- Regulation & classification of shipping
- Marine insurance
- Ship management
- Liner shipping
- International organisations
- Shipping economics
- Shipping finance
- Shipping technology
- Use of computers in shipping management and operations
- Integrated shipping
- Shipping management information systems
- Ship investment costs
- Ship operating costs
- Labour
- Shipping policy development
- Energy issues
- Market forecasting
- Ship operations planning

Hotel Accommodation

The PSA can assist if required, in booking the following hotels at special concessionary room rates for delegates.

Hotel	Nett rate per night	
	Single room	Twin room
Apollo	S$103	S$103
Equatorial	S$ 93	S$ 93
Kings	S$109	S$127
Merlin	S$108	S$125

Trave Documents/Arrangements

All delegates are required to possess valid passports, and visas to cover the duration of their stay in Singapore. Delegates will be met at Changi International Airport on their arrival by personnel from the Airport Meeting Services to expedite airport clearance formalities.

Nomination/Application

Nomination forms (enclosed) are to be completed and returned together with a bank draft/cheque for the appropriate amount and made payable to the "Port of Singapore Authority", not later than 10 December 1982.

Forms and Bank Drafts/Cheques should be addressed to:–

Training Manager
Port of Singapore Authority
Tanjong Pagar Complex
280 Tanjong Pagar Road
Singapore 0207
Republic of Singapore
Tel. No. : 2217711 Ext 827
Telex No. : 21507 Singapore
Cable : "Tanjong" Singapore

Venue

The Seminars will be held in the Conference Hall of the World Trade Centre Singapore. The World Trade Centre which is well furnished and fully air-conditioned, has excellent supporting convention facilities.

Fees

(a) Port Management and Operations
(US$950 per participant)
(b) Port Planning and Development
(US$950 per participant)
(c) Shipping Management and Operations
(US$950 per participant)

The following special rates will be available to delegates who participate in more than one Seminar:–
(i) Any two seminars US$1,700
(ii) All three seminars US$2,450

Fees will not include accommodation charges. These have to be borne by individual delegates.

Refund

80% of course fees will be refunded, should an accepted delegate decide to withdraw from the Seminar(s) on or after 24 December 1982. However, the sponsoring organisation may nominate an alternative delegate for the Seminar(s).

Certificates

Certificates of participation for each Seminar will be awarded to all delegates.

NOMINATION FORM
SEMINARS ON PORTS & SHIPPING
(10 JANUARY TO 24 JANUARY 1983)

I PARTICULARS OF SPONSORING ORGANISATION

NAME OF ORGANISATION_____
MAILING ADDRESS_____
TELEPHONE NO__TELEX NO___CABLE NO____
BRIEF DESCRIPTION OF COMPANY'S ACTIVITIES

II NUMBER NOMINATED FOR SEMINARS

PLEASE REGISTER OUR EXECUTIVES FOR THE FOLLOWING SEMINARS

SEMINAR TITLE/ DATES	NOS NOMINATED	NAMES OF NOMINEES
Port Management & Operations (17 to 21 Jan. 83)	_____	a_____ b_____ c_____
Port Planning & Development (17 to 21 Jan. 83)	_____	a_____ b_____ c_____
Shipping Management & Operations (20 to 28 Jan. 83)	_____	a_____ b_____ c_____

III PARTICULARS OF NOMINEES

1 Name:_____
Home Address:_____
Position/Designation in Company_____
Citizenship_____ Age_____
Professional/academic qualifications_____
Brief outline of current responsibilities_____
State briefly his/her interest in the seminar(s)_____

2 Name:_____
Home Address:_____
Position/Designation in Company_____
Citizenship_____ Age_____
Professional/academic qualifications_____
Brief outline of current responsibilities_____
State briefly his/her interest in the seminar(s)_____

3 Name:_____
Home Address:_____
Position/Designation in Company_____
Citizenship_____ Age_____
Professional/academic qualifications_____
Brief outline of current responsibilities_____
State briefly his/her interest in the seminar(s)_____

IV HOTEL RESERVATION

Name of nominee	Name of Hotel	Type of Room Required (Single/ Twin)	Check in date	Flight details & ETA in Singapore

(Payment for hotel accommodation & food to be settled with hotel directly)

V FEES

Bank draft/cheque for seminars fees should be made payable to the "Port of Singapore Authority".
Total amount of fees: US$_____
Bank draft/cheque no.:_____ Date_____
Name of Bank:_____
Name and Singapore official sponsoring nominee (s) of_____ Date____
Completed forms and seminar fees are to be despatched to:
The Training Manager, Port of Singapore Authority, 280, Tanjong Pagar Road, Singapore 0208 not later than 10 December 1982.

Appointment of New Chief Executive: Port of Penang

Mr. Lim Teik Chuan was recently appointed Director-General of the Penang Port Commission. Mr. Lim joined the organisation in 1959 as an Assistant Traffic Supervisor. He was promoted to the post of Management Services Manager in 1968. In 1971 he was promoted to Traffic Manager and subsequently became the Director of Operation in 1976.

Penang Port traffic

In 1981, cargo handled through the Port of Panang increased by 2% over 1980 despite the recession in the developed countries. The total volume of cargo handled was 6.22 million tonnes in 1981 compared to 6.10 million tonnes in 1980.

Bulk Cargo traffic which experienced an increase were sugar, coal and coke, soya beans, maize and palm oil.

On the other hand there was a decline in the export of ilmenite ore. Among the break bulk cargo there was an increase in the handling of iron and steel.

Containerised cargo saw a significant growth from 653,000 tonnes in 1980 to 832,000 tonnes an increase of 27%. Similarly in terms of TEU's, there was an increase of 26% from 44,637 TEU's in 1980 to 56,339 TEU's in 1981.

Tonnage handled by the Commission achieve a higher level of growth of 8% mainly due to the additional facilities provided. In 1981 the Commission handled 3.98 million tonnes or 64% of the total port traffic compared to 3.69 million tonnes in 1980 which represented 60% of the total port traffic.

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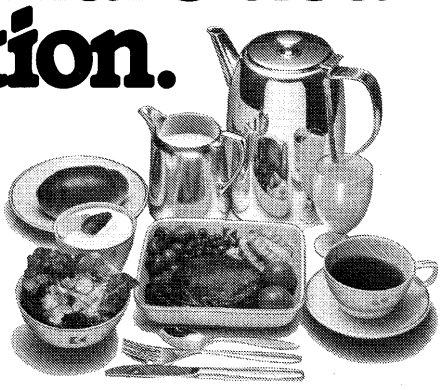

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6. Portainer® Operation Supervising System

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Material Handling Machinery Sales Department Tel. (03) 544-3677
Systems Headquarters Marketing Dept. Tel (03) 544-3272
Overseas Office: New York, Los Angeles, Mexico, London, Duesseldorf, Vienna, Singapore, Hong Kong, Rio de Janeiro

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