CURRENCY EQUIVALENTS
(as of January 31, 1992)

Currency Unit = Renminbi (RMB)
RMB 1 = US$0.0186
US$1.00 = RMB 5.37

FISCAL YEAR

January 1 - December 31

WEIGHTS AND MEASURES

1 cubic meter = 35.31 cubic feet
1 tonne = 1.1023 tons (short)

ABBREVIATIONS AND ACRONYMS

CIF	-	Cost, Insurance, and Freight
DPA	-	Dalian Port Authority
EPB	-	Environment Protection Bureau
GEF	-	Global Environment Facility
GOC	-	Government of China
GPA	-	Guangzhou Port Authority
ICB	-	International Competitive Bidding
LCB	-	Local Competitive Bidding
MARPOL	-	International Convention for the Prevention of Marine Pollution
MOC	-	Ministry of Communications
MOF	-	Ministry of Finance
NEPA	-	National Environment Protection Agency
NPA	-	Ningbo Port Authority
PRC	-	People's Republic of China
SOA	-	State Oceanic Administration
SPA	-	Shanghai Port Authority
SPC	-	State Planning Commission
TPA	-	Tianjin Port Authority
XPA	-	Xiamen Port Authority

PEOPLE'S REPUBLIC OF CHINA

SHIP WASTE DISPOSAL PROJECT

GEF Grant and Project Summary

Borrower: People's Republic of China (PRC)

Beneficiaries: The Government of China and the Port Authorities of Dalian, Tianjin, Shanghai, Ningbo, Guangzhou and Xiamen

Amount: SDR 22 million ($30 million equivalent)

Terms: Grant

Financing Plan:

Source	Local	Foreign	Total
	$ million		
PRC	19.8	-	19.8
GEF	14.6	15.4	30.0
IDA	7.4	7.6	15.0
Total	41.8	23.0	64.8

Economic Rate of Return: Not applicable

Staff Appraisal Report: Report No. 9852-CHA, dated May 19, 1992

Map: IBRD 23131R2

CHINA

SHIP WASTE DISPOSAL PROJECT

1. Background. China has undergone rapid economic growth over the past decade, which has been reflected in substantial growth in foreign and domestic trade and consequent growth in international and domestic shipping traffic through its ports. As a signatory to the 1973 and 1978 MARPOL Convention (International Convention for the Prevention of Marine Pollution) (Attachment 1), GOC has agreed to provide facilities for the reception, treatment and disposal of ships' wastes, including oil-contaminated ballast and bilge waters (MARPOL Annex I), chemically-contaminated waters (MARPOL Annex II), and sanitary sewage (MARPOL Annex IV) (but not garbage - MARPOL Annex V). All six ports, at present receiving World Bank assistance under five different operations, handle significant volumes of traffic, foreign as well as domestic, and these generate some 1.25 million tons of wastes annually. Much of this is now believed to be discharged at sea or in the coastal waters of China. The problem will only get worse in the future with further growth in traffic.

2. In view of the above, there is an urgent need to equip the ports with facilities to handle the wastes, thereby eliminating their discharge in international waters. The facilities to be established at the project ports will also serve as a model for replication at other Chinese ports as well as in other major ports in the region. Most of the ship waste handling facilities available at present in the six ports need to be rehabilitated, modernized, and/or expanded; in some cases new facilities have to be provided. Provision of proper facilities would facilitate the stricter enforcement of the relevant laws and regulations.

3. GOC promulgated the "Marine Environmental Protection Law of the People's Republic of China" on August 23, 1982; it came into force on March 1, 1983. The law includes provisions for the prevention of pollution damage to the marine environment by coastal construction projects, by offshore oil exploration, by land-based pollutants, and by vessels. Another law was promulgated for control of the dumping of wastes at sea on March 6, 1985. Authority for enforcing the laws is given to the National Environment Protection Agency (EPA), which oversees the Provincial Administrations that actually carry out the work. In almost every port, there is an Environment Protection Bureau (EPB) that polices pollution on land. The Harbor Superintendency Bureau under the Ministry of Communications (MOC) monitors pollution in waters of the port area, and the State Oceanographic Administration (SOA) controls pollution of sea waters outside the ports' jurisdiction.

4. Rationale for GEF Funding. GOC has designated environmental protection and improvement as an important goal under its eighth five-year plan (1991-1996). However, although China is a signatory to the MARPOL conventions, heavy demands on the available resources, particularly foreign exchange resources, including demands for investments in additional port capacity and in modernization of facilities and equipment, constrain the ability of the Port Authorities to finance the extensive facilities necessary to handle ships' wastes. Without proper facilities, pollution from the

dumping of ships' wastes in the three seas bordering China will continue unabated, and in fact will continue to grow with the projected growth in the country's foreign trade and associated shipping traffic. This is a situation where a modest (relative to China's needs) intervention by GEF in establishing modern ship waste handling facilities will demonstrate not only the environmental benefits of such facilities to China but also the feasibility of recovering the cost of such facilities through appropriate charges to users. At the same time, GEF funding will help establish the base for a ship waste tracking system that would eventually facilitate the control of ship dumping at sea. In order to function effectively, the GEF is to fund facilities at six of the main ports in China and the GOC will spread the facilities and tracking system to the rest of the ports in the future. GEF will fund almost half of the project: this is fully justified as about half the wastes to be received and treated at Chinese ports under the project would have been disposed of in international waters and the long term benefits to the health of shared international marine ecosystems are expected to outweigh immediate benefits to China.

5. Moreover, since China has no obligation or incentive to protect international waters from pollution from ocean-going vessels, GEF resources are being provided to compensate China for the costs of investments required to receive and treat ship generated wastes from ships plying international waters which visit its ports. One third of the traffic handled in the six ports is international. Domestic traffic, accounting for the other two thirds, also uses international waters. Thus, overall, vessels serving the six ports use about equally the national and international waters. This is the basis for the GEF share of financing for the project, somewhat less than 50% of total project costs.

6. Project Objective. The objective of the proposed project is to reduce pollution of international and territorial waters caused by ships' wastes through: (a) improved monitoring and analysis of the nature and magnitude of the problem; (b) improved policy, regulatory and incentive frameworks; and (c) the provision of facilities to receive, treat and safely dispose of ship wastes. Towards this end, the project will provide financial and technical assistance to GOC and the six Port Authorities for the construction and/or rehabilitation and expansion of ships' waste disposal facilities. While limited to the six ports serving a major part of China's sea-borne international traffic, the proposed project will serve as a model for other ports in the country, as well as for ports in other countries, particularly those in the region, and provide a solid basis for environmental monitoring activities and oil spill contingency planning.

7. Project Description. The project has two components: a national component and a ports' component. The national component comprises: (a) the establishment of baseline data on international ship traffic, related waste types and quantities through design and implementation of a pilot inter-port ship waste monitoring system to facilitate monitoring and enforcement; (b) preparation of a comprehensive oil spill contingency plan for each port; (c) preparation of terms of reference of a study for a Large Marine Ecosystem monitoring program for the Yellow Sea; (d) undertaking of a study to assess and develop a system for the treatment of chemically contaminated water; (e) provision of facilities to upgrade environmental monitoring capabilities at the ports, coastal waters as well as international waters, and promotion of

coordination among the various authorities; (f) preparation of a tarrif schedule based on cost recovery; and (g) provision of consultant services and training. The ports' component comprises: (a) provision or development of appropriate waste reception and disposal facilities at the ports of Dalian, Tianjin, Shanghai, Ningbo, Xiamen and Guangzhou; and (b) the establishment or upgrading of environmental monitoring and enforcement by the Port Authorities.

8. The total cost of the project is estimated at $64.8 million, with a foreign exchange component of $23.0 million (Schedule A). Of the total financing required, GEF would provide $30 million equivalent, the Association would finance $15 million equivalent, and GOC and the Port Authorities the remaining $19.8 million. The procurement methods and the disbursement schedule are shown in Schedule B and a timetable of key project processing events in Schedule C. The project is expected to be completed by June 30, 1995, and disbursements completed by June 30, 1996.

9. Agreed Actions/Conditions. During negotiations with GOC, agreement was reached on the following key matters:

(a) GOC will submit to the Association, by June 30, 1994, a proposal for an appropriate tariff schedule, based on cost recovery, for the services of the waste disposal facilities and this will be introduced by all six ports by June 30, 1995, taking into account the Association's comments;

(b) the Xiamen Port Authority will establish, by June 30, 1993, an adequately staffed Environment Protection Bureau, to supervise and operate the proposed ship waste disposal facilities; and

(c) GOC and each of the Port Authorities will jointly set up a coordinating team at each port comprised of representatives from the concerned Port Authority, EPB, NEPA, and SOA under terms of reference agreed with the Association by December 31, 1992.

10. Environmental Aspects. The design and implementation of the project and the operation of the project facilities after completion would comply with GOC's laws and regulations on environmental protection, which are more than adequate by international standards. Worker safety and environmental safety features will be incorporated in the design of all components. Completion of the project will help to reduce pollution resulting from the discharge at sea of oil-contaminated waters, sanitary sewage and garbage/solid wastes.

11. Benefits. The six ports selected for the project handle some 90 percent of the international shipping serving the sea-borne foreign trade of the People's Republic of China (PRC). In addition, these ports serve a significant portion of the country's domestic maritime traffic. In several of the ports, the lack or poor capability of waste reception facilities obliges the Port Authorities to allow ships to discharge their wastes at sea or has created considerable delays in serving the ships. This contributes to port inefficiency and to pollution of both international and Chinese coastal waters. Provision of the proposed facilities should contribute to a major improvement to the marine environment quality and serve as a model for establishing similar facilities in other Chinese ports.

12. Risks. The main risks relate to project implementation and cost recovery. As this is a substantially new activity for most of the ports, technical assistance through close project supervision will be provided to ensure satisfactory implementation. As to cost recovery, PRC's record in the matter of introducing adequate cost recovery mechanisms has so far been good, and GOC has indicated that there would be no difficulty in the ports introducing a cost-based tariff schedule for the new services.

13. Environmental Assessment. The project has been reviewed by the Regional Environmental Division and it has been placed in the environment screening category "B". Monitoring and evaluation are built into the project and will be reported by the project management on a quarterly basis.

SCHEDULE A

CHINA

SHIP WASTE DISPOSAL PROJECT

Estimated Costs and Financing Plan
($ million)

	Project Cost[1]			of which	
	Local	Foreign	Total	IDA	GEF
National Component:					
Environment monitoring & tracking	0.65	1.35	2.00	0.54	1.09
Oil spill contingency planning study	-	0.45	0.45	-	0.42
Chemically contaminated water treatment study	-	0.25	0.25	-	0.23
Subtotal	0.65	2.05	2.70	0.54	1.74
Ports' Component:					
Disposal Facilities:					
Dalian	1.15	2.05	3.20	0.78	1.60
Tianjin	7.00	2.00	9.00	2.05	3.92
Shanghai	16.30	8.50	24.80	5.20	10.08
Ningbo	4.80	1.70	6.50	1.83	3.55
Guangzhou	5.36	3.20	8.56	2.08	4.17
Xiamen	3.52	1.61	5.13	1.37	2.68
Technical assistance to Xiamen Port Authority	-	0.03	0.03	-	0.03
Subtotal	38.13	19.09	57.22	13.31	26.03
Base Cost	38.78	21.14	59.92	13.85	27.77
Physical contingencies	1.48	0.86	2.34	0.55	1.07
Price contingencies	1.54	1.00	2.54	0.60	1.16
TOTAL COST	41.80	23.00	64.80	15.00	30.00
Financing Plan:					
PRC and the Port Authorities	19.80	-	19.80		
GEF	14.60	15.40	30.00		
IDA	7.40	7.60	15.00		
Total	41.80	23.00	64.80		

[1] In January 1992 prices. The project is exempt from taxes and duties.

SCHEDULE B

CHINA

Ship Waste Disposal Project

Procurement Method and Disbursements
($ million)

	Procurement Method				Total
	ICB	LCB	Other	NIF	
Civil works	-	10.85	2.00	6.92	19.77
(IDA)	-	(1.40)	-	-	(1.40)
(GEF)	-	(1.53)	(0.54)	-	(2.07)
Equipment	38.80	-	2.00	3.50	44.30
(IDA)	(12.60)	-	(1.00)	-	(13.60)
(GEF)	(26.20)	-	(1.00)	-	(27.20)
Technical assistance	-	-	0.73	-	0.73
(IDA)	-	-	-	-	-
(GEF)	-	-	(0.73)	-	(0.73)
Total	38.80	10.85	4.73	10.42	64.80
(IDA)	(12.60)	(1.40)	(1.00)		(15.00)
(GEF)	(26.20)	(1.53)	(2.27)		(30.00)

Notes: (1) Items in parentheses represent the portions financed by the IDA credit and GEF grant, respectively.
(2) NIF: Non-IDA or GEF financed.

Disbursements from GEF Grant

Category	Amount of grant to be allocated	% of Expenditures to be financed
Civil Works	2.07	27%
Equipment and Materials	27.20	100% of foreign expenditures, 100% of local expenditures (ex-factory) and 75% of local expenditures for other items procured locally
Training & Tech. Asst.	0.73	100%

Estimated Disbursements

	IDA FY			
	1993	1994	1995	1996
	$ million			
IDA Annual	0.0	0.0	10.0	5.0
Cumulative	0.0	0.0	10.0	15.0
GEF Annual	6.0	20.0	4.0	0.0
Cumulative	6.0	26.0	30.0	30.0

SCHEDULE C

CHINA

Ship Waste Disposal Project

Timetable of Key Project Processing Events

Time taken to prepare	:	Nine months
Prepared by	:	GOC, the Port Authorities of Dalian, Tianjin, Shanghai, Ningbo, Xiamen and Guangzhou (Huangpu), and the Association
First Bank Mission	:	April 1991
Appraisal Mission Departure	:	April 1991
Negotiations	:	April 1992
Planned Date of Effectiveness	:	September 1992 (expected)
List of Relevant PCRs and PPARs	:	Three Ports Project (Loan 2207-CHA), Project Performance Audit Report, January 31, 1991.

CHINA

SHIP WASTE DISPOSAL PROJECT

Technical Report

May 19, 1992

CHINA

SHIP WASTE DISPOSAL PROJECT

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IBRD No. 23131R2

CHINA

SHIP WASTE DISPOSAL PROJECT

I. THE ENVIRONMENT SECTOR

A. Environmental Conditions in China

1.1 Growing urban populations and industrialization are causing widespread air, water, and soil pollution in China, as elsewhere, and environmental problems have become issues of the highest priority. Due to past industrial location policies, many large industries are located close to or within urban residential areas which are also rapidly expanding. Gaseous emissions, untreated or improperly treated liquid effluents, and unwanted refuse from industries and domestic premises, industrial hazardous and toxic wastes, and high noise levels from congested traffic, factories, and commercial complexes, are significantly polluting the environment and affecting the health of the residents of heavily populated urban areas.

1.2 Water pollution from urban and industrial waste water discharges poses possibly the most severe problem. Many important water resources, which are already scarce in most regions, are already seriously threatened. The burning of bituminous coal is causing serious atmospheric pollution from airborne particulate and sulfur dioxide emissions in inner cities and industrial areas, and directly affecting human health. Few countries are as dependent on coal as China, with annual consumption now approaching 1 billion tons. Domestic garbage and industrial solid waste often pile up uncovered in random heaps around large cities, as a result of poor past, and in many cases even present, solid waste disposal practice. In the countryside, excessive use of water and inappropriate use of fertilizers and pesticides, as well as irrigation in some areas, have begun to create environmental problems.

B. Environmental Conditions of Coastal Waters

1.3 Many of China's largest urban centers are clustered along the coast and thus their industrial and sanitary wastes are discharged into the coastal marine waters. Treatment of such effluents is highly variable, ranging from virtually no treatment in Guangzhou in the south to secondary treatment of part of the wastes in Shanghai. Treatment at source of industrial effluents is generally not undertaken leading to potential pollution by trace metal and organic contaminants of the combined sewage waters. With some notable exceptions (e.g., Huangpu River in Shanghai), good circulation of local receiving waters maintains coastal and estuarine waters in reasonably good condition (PRC National Water Standard Class 2 or 3, Table 1). However, as the urban centers expand, combined with development of new economic/industrial zones, maintenance of coastal water quality will require more widespread use of adequate sewage treatment and disposal systems.

1.4 There are three major river systems discharging into the China coastal sea lane: Huang He (Yellow River) into the Yellow Sea, Chang Jiang (Yangtze River) into the East China Sea and the Xi Jiang (Pearl River into the South China Sea); there are numerous smaller rivers. These river systems are well known to transport extremely large quantities of suspended solids, the result of erosion of inland areas, and potentially, contaminants associated with the solids (e.g., pesticides, fertilizers, industrial discharges). Extensive monitoring of water and sediment quality has been undertaken of, at least, the three major systems since 1984. Water quality is typically of National Water Quality Class 2 or 3; however, accumulations of contaminants in the sediments with a resultant impact on the sediment biological community have been noted, for example loadings of contaminants near Shanghai on the

lower Chang Jiang. Comparisons of the adjacent coastal to international waters have not been undertaken.

1.5 The State Oceanographic Administration (SOA) has been conducting marine monitoring and assessment studies of the coastal and international waters since 1974, for such parameters as petroleum hydrocarbons, trace metals and other general water quality parameters, as well as sediment quality and status of the marine biological community. Through three major centers (Dalian, Shanghai, and Guangzhou), SOA monitors water quality twice a year at over 100 stations in deeper waters, some 400 stations in collaboration with the Harbor Superintendency Administration (HSA) for oil pollution and industrial wastes, and 240 stations in major estuaries (typically in the outer reaches; other agencies are responsible for the remaining sections of the rivers). Sediments at many of these sites are monitored once a year, and the status of the marine biological community once every two years. SOA has just completed a comprehensive "Mussel-watch" type program to assess contaminant distribution and biodiversity in conjunction with HSA. A more detailed description of SOA activities is available in the project file.

1.6 Specific pollution attributable to ships wastes and marine traffic through the coastal sea lane is difficult to quantify. Estimates can be derived from comments by HSA that many ports are able to handle only 20-30 percent of estimated quantities of garbage/solid wastes, none of the ports have facilities or barges to permit pumping out of sanitary sewage for subsequent treatment, and, with the exception of Dalian and Shanghai, facilities for the reception and treatment of oily waters are limited in capacity and treatment capability. Assuming optimistically that 30 percent of the waste is being properly handled and treated, then 800,000 to 900,000 tons are being discharged annually into coastal and international waters.

C. Sector Organization

1.7 The government of each administrative region is responsible for enforcing environment protection laws, primarily through its Environment Protection Bureau (EPB). At the national level, the National Environmental Protection Agency (NEPA) is responsible for (a) determining national environmental policies for air, water, soil, wastes, noise, etc.; (b) designing national environmental regulations and standards; (c) environmental monitoring; (d) providing guidance to the provinces on environmental matters; and (e) research. Many port authorities have set up EPBs reporting through a deputy director. These bureaus handle monitoring and operation of pollution control equipment, and are responsible for preparing appropriate documentation, such as environment impact statements, state-of-the-environment reporting, and environment aspects of engineering feasibility and operational studies. Each municipality also has a Municipal Environment Protection Bureau (MEPB) responsible for monitoring all aspects of pollution and enforcement of national environmental protection laws and regulations.

1.8 Under the Marine Environmental Protection Law, the Harbor Superintendency Administration (HSA) is responsible for monitoring pollution or accidental spillage from ships, which includes examining waste treatment facilities on bulk carriers. Although operating mostly inside harbors, HSA is also responsible for responding to spills and pollution from ships in coastal waters; however, it lacks the facilities and equipment to do so. Along with NEPA, SOA is also responsible for environmental quality at the national level. SOA functions include marine environmental research and monitoring, but mostly of waters outside harbors. Data from their studies are helpful for revising or developing regulations and regulatory limits.

D. Sectoral Issues and Problems

1.9 The emphasis on economic development in the 1970s encouraged growth without special regard for pollution control. Hence, environmental conditions have seriously deteriorated. Beginning with the 7th FYP (1986-90), GOC and the local authorities have taken greater initiatives to improve the environment and to enforce important regulations. These include a strict requirement for environmental impact assessments on new projects that may pose environmental problems. A key initiative is the required simultaneous assessment and interaction of economic, engineering and environmental aspects of all projects, from the earliest feasibility study stage to the final operations stage. During the feasibility study stage, the environment impact assessment (EIA) for port and water projects employs state-of-the-art EA techniques and addresses environmental protection and mitigation issues and overall environment management.

1.10 For existing polluters, problems arise when the cost of cleanup is high. Since local authorities are often the owners of the polluting enterprises, they may be reluctant to jeopardize the financial viability of the enterprises through expensive cleanup measures. Thus financial constraints slow the progress of pollution abatement. Current industrial cleanup measures include mostly end-of-pipe treatment, a term that denotes treatment rather than reduction or waste avoidance. The Central Government, with the Bank's assistance, is considering more preventive measures, i.e., more efficient and economical methods for reducing pollution through recycling, process modification, and the use of less polluting inputs. Often when technological change is the preferred solution, lack of financial resources—especially foreign exchange—is generally a barrier.

1.11 To deter pollution, the Central Government introduced a system of charging for pollution and imposing penalties for exceeding set pollution limits. About 80 percent of the funds derived from these charges are used for pollution abatement measures or facilities. A range of unit charges (based on concentration) covers each type of pollution. Within this range, local governments who enforce the regulations can set the charges. Often, however, the charges are too low even at the top of the range to deter pollution, since polluters often find it cheaper to pay the penalties rather than take more costly abatement measures. Also, even though the amount collected from penalties is not insignificant, it is too small to significantly assist polluters in cleanup. If further measures are not found to finance pollution abatement efforts, environmental improvement will be slow.

1.12 The main focus of the environmental efforts of the Eighth Five-Year Plan (1991-95) is on urban and regional environmental strategies, since they are recognized as major sources of marine pollution. Plans include the construction of upgraded sanitary sewage facilities (e.g., the Bank-financed facilities for Shanghai), active participation in various international conventions, such as the International Convention for the Prevention of Pollution from Ships (MARPOL), and development of environmental strategies for key coastal areas (e.g., a recently approved grant, financed under the Japan Grant Facility administered by the Bank, to finance a large-scale, environmental study of Hangzhou Wan, China's most productive, but increasingly polluted, bay. Hangzhou Wan lies between the port of Shanghai (to the north) and the port of Ningbo (to the south).

E. The Bank's Role and Sector Strategy

1.13 The Bank's role in the environment sector in China is to assist the Government in (a) developing appropriate strategies for improving and maintaining the quality of the environment (to optimize total benefits, including those from improvements in the efficiency of industrial production and the use of natural

resources); (b) planning and prioritizing needs for environmental improvement, and identifying and preparing plans for the most cost-effective projects; (c) providing project funding and attracting other sources of external financing; (d) strengthening institutions responsible for enforcing environmental protection regulations, as well as those that operate community systems for environmental pollution abatement; and (e) promoting sound financial and cost recovery policies to sustain viable operation of the urban services required for reducing environmental pollution. Because of the magnitude of the problem, the Bank's work on the environment in China is receiving much attention and support from the international community. In many instances, the Bank is well positioned to direct this attention and support to high-priority areas.

1.14 The linkage between the economy and environment at the urban level offers the Bank an excellent comparative advantage. The Bank is assisting with the economic analysis of underlying causes of environmental degradation and the use of economic techniques to set priorities for improving and protecting the environment. It also provides technical help in designing policies and making investments, particularly in waste avoidance, waste reduction, and pollution control technologies and projects. The design of five comprehensive urban and provincial environmental projects currently under preparation will address strategies for managing and treating water resources, minimizing industrial wastes and controlling pollution of water, air, and land, including managing hazardous and toxic wastes. These five projects will also include components to develop long-term, least-cost environmental strategies, policies, and investment programs, as well as provide institutional development assistance to the respective provincial and municipal environmental protection bureaus, planning commissions, and public utilities.

1.15 Bank technical assistance related to the environment includes activities at the national, provincial, and municipal levels. Assistance (through the Japan Grant Facility administered by the Bank) to the National Environmental Protection Agency (NEPA) was recently approved. This will help NEPA strengthen its research, planning, and implementation of environmental policies in five areas: (a) environmental impact assessment; (b) waste minimization and pollution control in rural industries; (c) environmental planning and economic incentives; (d) hazardous and toxic waste management; and (e) environmental information systems. The Bank is also providing technical assistance under various projects to environment departments in several sectors or line ministries.

II. THE PORTS SUBSECTOR

A. Port Traffic

2.1 Six of China's 15 major deep-water ports (Shanghai, Dalian, Xiamen, Ningbo, Guangzhou, and Tianjin) handle over 80 percent of the total traffic. Shanghai, with over 100 berths, is one of the ten largest ports in the world. In 1987, it handled 128 million tons of cargo and more than 12 million passengers. The port of Ningbo, which is close to Shanghai, is one of China's few natural deep-water ports; it is the only deep-water port on China's mid-eastern seaboard. Many other minor ports connect China's extensive coastline and 110,000 km of navigable waterways.

2.2 Since opening its economy to foreign trade in the late 1970s, traffic through China's 15 major ports has more than doubled to 440 million tons in 1989. Compared with that of many developing countries, however, port traffic in China is low in relation to the size of its economy. Foreign trade is expected to continue

growing in step with the economy as a whole: the Eighth Five-Year Plan envisions total port traffic reaching 700 million tons by 1995, which will be more than 45 percent higher than the volume projected for 1990.

B. Organization and Management

2.3 One of the most important challenges facing the management of China's ports is how to adapt the ports to the changing circumstances brought about by the economic reforms initiated in 1979. The port subsector was not affected by the economic reforms until 1984, when the Ministry of Communications (MOC) began to decentralize the ports. The decentralization featured (a) self-financing of port operations, (b) investments funded by internal cash generation, and (c) increasing competition among ports for cargo. Before the decentralization, MOC set tariffs, allocated cargo, provided grant financing for major investments, covered any deficits, and received most of the surpluses generated by the ports. Now only a portion of the total cargo is allocated, tariffs for unallocated cargo may be set competitively within a narrow range, and profits (subject to taxes) are retained by the ports. The Government progressively plans to reduce controlled allocation of traffic, reform tariffs and taxation policies, and phase out grant financing of investments.

2.4 The ports of Tianjin, Shanghai, Dalian, and Guangzhou (Huangpu) were the first to be decentralized. A "Pilot System Reform," introduced in Tianjin in 1984, transferred primary leadership of the port from MOC to the local government. The port was exempted from paying any taxes on profits until 1990. Since the reforms, the port has had much more autonomy in management, investment planning, and control over its finances. In 1986, the ports of Shanghai and Dalian were decentralized with modified provisions for taxes and grant financing of investments: they were to pay a fixed lump sum tax, obtain MOC approval for large investments, and receive some grant financing through 1990. Huangpu port was similarly decentralized, though specific provisions were again slightly different. All the ports remaining under MOC control were given greater financial autonomy from the end of 1988.

2.5 While it is still early to evaluate the different models adopted to improve port management, it appears that future policy will likely treat ports more fairly and uniformly. In order to develop efficient policies on taxation, tariffs, and the financing of investments, better information on port operations, costs, and finances must be made available. The Bank is helping MOC conduct studies that include research on alternative organizational forms employed in other countries, as well as on development of port costing systems.

C. Operations and Maintenance

2.6 Although most major ports in China operate round the clock with a three-shift system, operations are increasingly hampered by congestion inside the port areas, mainly because of the lack of adequate specialized facilities. Technological and institutional factors contribute to inefficiency and congestion. In 1985, average delays for foreign trade vessels were as high as 11 days. Government restrictions on imports improved the situation somewhat in 1986, but major ports experienced increased congestion again with average waiting times of four to five days.

2.7 Port congestion in many southern and eastern ports could be alleviated by rationalizing cargo movements through the use of modern sea-going barges for direct transfers of cargo between ports. MOC has begun to rationalize traffic flows and, as part of the Ningbo Port Project, cargo and shipping movements in the mid-eastern region are being studied. The ports of Shanghai and Dalian have retained

consultants to review operations, identify weaknesses, and recommend improvements. At the ports of Ningbo, Xiamen, and Shanghai, the Bank has mounted similar reviews of operations and maintenance, and has agreed with these ports on specific performance targets within specific time frames.

2.8 Excessive reliance on break-bulk handling has resulted in berth productivity levels for general cargo as low as 50 percent of levels achievable with unitized cargo handling. Clearly, more specialized handling facilities are needed to increase the level of cargo unitization for break-bulk cargoes. Some progress has been made in containerization for foreign trade, although little has been achieved in domestic trade. Using pallets to move break-bulk cargo is a feasible and cost-effective means of increasing unitization of domestic break-bulk cargo; savings would result both from improved productivity and reductions in cargo damage and loss.

2.9 The proper interfacing of different transportation modes is an aspect of port development which is now receiving the urgent attention of MOC. However, only road connections are within MOC's jurisdiction, while railways are the responsibility of the Ministry of Railways (MOR). MOR itself is facing a serious shortage of capacity, and must coordinate its own priority projects with those of MOC.

D. Tariffs

2.10 China's ports have two levels of tariffs - - one for foreign trade and another for domestic trade. Foreign ships pay the published harbor dues and charges, which seem to be set on the basis of what the market will bear, while Chinese vessels pay lower rates, which seem to reflect the relative financial strengths of the China Ocean Shipping Company (COSCO) and the ports and their different investment requirements. Chinese ports have no shipping conference rates, and the ports only rarely pay demurrage charges for ship waiting, which are usually paid by the cargo owner. Recently, however, ports have been signing dispatch agreements with ship operators that guarantee a certain turnaround time: the port pays demurrage charges if the time is exceeded or the ship pays premiums if cargo is handled faster. Usually the premiums far exceed the demurrage charges.

2.11 The structure and level of port tariffs are determined jointly by MOC, MOF, and the State Price Bureau. The present tariff structure was established in 1978 (and was revised in 1985 for foreign trade vessels) on the basis of a somewhat arbitrary allocation of costs to the different port services. Tax agreements between the ports and the Ministry of Finance (MOF) expired in 1990; future tax and tariff policies are presently under review. The structure reflects all the distortions inherent in the prices of the different factor inputs. As a first step toward rationalizing tariffs, MOC is currently carrying out a comprehensive Costing and Management Information System (PCMIS) study (funded by the Japanese Government), with the assistance of the Bank, which will be responsible for developing an accurate and uniform costing system. After the system has been developed under MOC's auspices, it will be tested at selected ports before adoption at all major ports. Port authorities must become more aware of the cost of providing specific services as well as whether depreciation funds and other funds needed to cover liabilities are adequate. Further, since grant financing and the large investments planned for China's ports will be eliminated (to accommodate increased trade flows and recent large increases in domestic transport demand), the future financial liabilities of ports are likely to increase rapidly. Hence, the Government and port managers must pay special attention to costing port operations, managing their finances, and assuring the long-term viability of investments.

2.12 Tariff reform is necessary both to assure the future financial health of the ports and to ensure that port tariffs provide incentives for efficient utilization of port assets. In many instances the present tariff structure is inefficient on both counts. For instance, the relative prices for handling break-bulk cargo, pelletized cars, and container cargo do not reflect costs; they actually discourage shippers from using more efficient unitized cargo-handling technology. Also, relatively low port storage charges encourage shippers to overutilize port storage facilities, thereby causing congestion in the ports. Therefore, tariff reform must focus on the level of tariffs as well as on the structure.

E. Environmental Conditions in Chinese Ports

2.13 China's rapid economic growth over the past decade has been reflected in substantial increases in foreign and domestic trade and consequent growth in international and domestic shipping traffic through its ports. This increased ship traffic has resulted in discharges at sea of associated wastes, such as oily ballast and bilge waters, sanitary sewage, and garbage or solid wastes. The volume of 1990 ship traffic and the estimated wastes generated by such traffic are presented in Attachment 1. A summary of 1990 data, as well as forecasts for 1995, are given below:

Port	Ship Traffic (no.)		Wastes generated (thousand tons)	
	1990	1995	1990	1995
Dalian	10,900	13,000	225	300
Tianjin	5,500	8,000	114	150
Shanghai	25,400	30,000	500	600
Ningbo	1,400	3,000	28	60
Guangzhou	8,400	10,500	210	250
Xiamen	10,700	16,000	163	240
Total	62,300	80,500	1,240	1,600

Source: Bank staff, 1991.

2.14 China has an extensive coastline bordering on three regional seas: the Yellow Sea, the East China Sea, and the South China Sea. Many areas within these waters are important sources of harvested marine resources both for China and other nations. The World Oceans are divided into 52 large marine ecosystems (LME) that provide more than 90 percent of the ocean resources. The Yellow Sea is one of these ecosystems that requires preservation. Protection of the environmental quality of these waters is critical for maintaining a major food source, and is reflected in one of the goals of the Eighth Five-Year Plan (1991-96). PRC has recognized the need to improve the protection and conservation of the environment, including that of both coastal and adjacent international marine waters. Policies include construction of upgraded sanitary sewage facilities (e.g., City of Shanghai), improved industrial waste management, and active participation in various international agreements, such as the International Convention for the Prevention of Pollution from Ships (MARPOL).

2.15 One key mechanism for environmental protection of marine waters is the 1973/78 MARPOL Convention (Attachment 1), to which PRC became a signatory in 1984. Under this convention, ships are permitted to discharge wastes at sea only under controlled conditions (e.g., oil tanker ballast waters may not contain more than 15 mg/L of hydrocarbons), and ports are to provide facilities for the reception, treatment, and disposal of ships' wastes. Four types of wastes have been identified:

(a) oily ballast and bilge waters (MARPOL Annex 1);

(b) chemically contaminated ballast and bilge waters (MARPOL Annex 2);

(c) sanitary sewage (MARPOL Annex 4); and

(d) garbage or solid wastes (MARPOL Annex 5).[2]

Of these, MARPOL Annex 4 has not yet come into force because of limited worldwide port reception facilities for sewage.

2.16 Attachment 2 gives a summary of existing waste reception facilities in the six major foreign trade ports in China covered under this project (Dalian, Tianjin, Shanghai, Ningbo, Guangzhou, and Xiamen). Of the six ports, only Dalian and Shanghai have the facilities and infrastructure potential to handle ships' wastes. However, even these facilities are outdated and barely able to meet present demands. Waste volumes projected for the future will clearly exceed existing capacity. At Xing Zhao near Guangzhou, the Guangzhou Bureau of Maritime Transport Administration (BOMTA) is establishing a facility to handle oily ballast from its ships, eliminating the need for such a separate GPA facility. <u>During negotiations assurances were obtained from the GPA that GPA will enter into arrangements, satisfactory to the Association, with BOMTA to handle the oily ballast and bilge waters for all port users at the proposed BOMTA facility at Xin Zhao</u>.

2.17 The provision of proper waste management facilities, coupled with an appropriate regulatory and monitoring regime and fee schedule, should significantly reduce the quantities of pollutant wastes discharged at sea. Construction of the facilities would also provide a model for other ports in China.

F. <u>Regulatory Framework for Environment Control</u>

2.18 As a signatory to MARPOL, China has enacted the Marine Environment Protection Law (March 1, 1983). Chapter 5 of the law specifically addresses prevention of pollution from vessels. PRC subsequently developed a set of detailed regulations on pollution from vessels. In general, these regulations are stricter than present international guidelines (see Table 2). For example, the oil content permitted in discharge water is less than 10 mg/l (ppm), compared with the international guideline of 15 mg/l (ppm). However, these regulations are not at present being strictly enforced and monitored primarily due to lack of waste reception facilities.

2.19 Many port authorities have set up an Environmental Protection Bureau reporting through a deputy director. These bureaus undertake monitoring and operation of pollution control equipment, and are responsible for preparing appropriate documentation, such as environmental impact statements, state of the

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[2] MARPOL Annex 3 deals with harmful substances carried in packaged form in freight containers and portable tanks.

environment reporting, and environmental aspects of engineering feasibility and operational studies. Each municipality also has a Municipal Environment Protection Bureau responsible for monitoring all aspects of pollution and enforcement of national environmental protection laws and regulations. Presently none of the ports has a specific fee to permit cost recovery for the capital or operating costs of the proposed facilities.

G. Role of the Bank Group

2.20 The Bank has supported the Government's objective of expanding capacity and improving productivity in the ports since 1982. The first lending operation in the subsector (Three Ports Projects, Loan 2207-CHA) financed additional container handling capacity in Shanghai, Huangpu and Tianjin and a coal terminal at Huangpu. The second (Tianjin Port Project, Loan 2689-CHA) is financing the construction of eleven additional berths at Tianjin for timber, construction materials and general cargo. The third (Huangpu Port Project Loan 2877-CHA/Credit 1845-CHA) is financing the construction of five additional berths in the Xinsha area of Huangpu district of Guangzhou port for coal, iron ore, bulk fertilizer and general cargo. The fourth (Dalian Port Project Loan 2907-CHA/Credit 1875-CHA) is financing construction of a new terminal at Dayao Bay for container and break-bulk cargo. The fifth (Ningbo and Shanghai ports project, Loan 3006-CHA) is financing expansions at both Ningbo and Shanghai ports. The sixth (Xiamen Port Project, Loan 3007-CHA) is financing construction of four additional berths at Xiamen. Physical implementation of projects has been good, with projects generally on schedule and below estimated costs.

2.21 Earlier Bank projects supported management systems improvements with components addressing computer development, technical studies, training, and containerization of cargo. The work of Bank missions has also been instrumental in developing Chinese expertise in the economic evaluation of investment projects and in updating various aspects of port operations. A study is under way to help GOC determine the most economic pattern of development for the various ports in mid-eastern China, particularly Shanghai and Ningbo ports.

2.22 Several studies in the port and shipping subsectors have been initiated under previous Bank projects. They include a containerization study which was completed by the Comprehensive Transport Research Institute in 1985. Recent investments in container facilities have benefitted from the insights provided by this effort. Studies included under ongoing port projects include an Intermodal Cargo Distribution Study as part of the Huangpu Port Project (for the south), a similar effort to be undertaken in the Dalian Port Project (for North China), Port Costing and Management Information Study, etc. From all these projects it became evident that mitigation measures to improve and/or to protect the marine environment is sorely needed.

2.23 Even though China signed the MARPOL convention in 1984, specific pollution abatement measures have not been included in Bank projects as they depend for their effectiveness on a national policy across all ports, at least the major ones in foreign trade. A policy is now taking shape on this matter, and provides the Bank Group a unique opportunity through the project, supported by GEF, to assist and encourage GOC to implement a comprehensive program to monitor ship movements and waste discharges along the coastal sea lane, as well as to provide facilities and strengthen the regulatory framework (incentives and penalties) for ships to discharge their wastes in an environmentally safe manner.

2.24 Of the Bank-financed port projects, only one has been completed so far--the Three Ports Project. The primary project aim was to create additional port capacity in Tianjin, Shanghai and Huangpu. Other aims of the project were that

during project implementation (i) the government would evolve a long-term national port strategy and (ii) the Bank would establish a dialogue with the borrower on the basis of three studies included in the project. The principal objective to create additional port capacity and prevent port congestion was accomplished fully and on time. The economic rate of return of 34 percent compared with 29 percent at appraisal; operation and maintenance of terminals were efficient. But the Government did not evolve at that time a long-term strategy, and preparation by the borrower of the three studies and the Project Completion Report was not satisfactory. The Bank Group, however, is now assisting GOC in evolving a port development strategy for the southern half of China, and a number of other important studies are underway.

III. THE PROJECT

A. Objective

3.1 The objective of the project is to reduce pollution of international and Chinese territorial waters caused by ships' wastes through: (a) improved monitoring and analysis of the nature and magnitude of the problem; (b) improved policy, regulatory, and incentive frameworks; and (c) the provision of infrastructure to receive and safely dispose of ship wastes.

B. Description

3.2 The project consists of a national component and a ports' component, as follows:

National Component

(a) establishing baseline data on international ship traffic, related waste types and quantities by designing a pilot interport ship waste transferring system to facilitate enforcement;

(b) preparing a comprehensive oil spill contingency plan for each port (including identification of selected equipment);

(c) preparing terms of reference for undertaking a study of a Large Marine Ecosystem (LME) monitoring program for the Yellow Sea;

(d) undertaking a study to develop a system for the treatment of chemically contaminated water;

(e) promoting coordination among the various authorities to upgrade environmental monitoring capabilities at the ports, coastal waters as well as international waters;

(f) preparing and implementing a tariff schedule based on cost recovery; and

(g) providing consultants' services and training in connection with or related to activities under the project.

Ports' Component

(a) provision of appropriate waste reception and disposal facilities at the ports of Dalian, Tianjin, Shanghai, Ningbo, Xiamen and Guangzhou; and

(b) establishing or upgrading environmental monitoring and enforcement capabilities of each of the Port Authorities.

National Component

3.3 Interport Ship Waste Tracking System. The provision of waste reception and treatment facilities in each port will permit ships the effective option of safe discharge of wastes in port. This can be enforced to a certain extent by HSA, but to realistically evaluate compliance with the Marine Environment Law and to provide an evaluation mechanism for the project, it is proposed to develop and operate a port-to-port waste tracking system. At the port of departure, information as to projected volumes of wastes will be collected and entered into a data base through

specific software. This information will be forwarded to the next port of call. At each port, the volumes and characteristics of the wastes discharged will be compared to the information forwarded from the port of departure. Thus HSA will be able to evaluate whether a ship illegally discharged wastes at sea, in contravention of existing regulations. Software programs for this purpose are in use at a number of ports in Europe. The project will include: (a) development of a specific software program and of the information delivery and manifest system, as a first phase; (b) purchase and installation of "PC"-type computers in each of the six project ports, linked through computer modem with the other project ports and with HSA in Beijing, and training of port staff in operating the program, as a second phase. For the project to be successful, it will also require the cooperation of the shipping companies and ship personnel; the project will include consultation and training sessions with shipping companies and ship personnel. A third phase of the tracking system is its eventual coverage of all important ports on the coast of China.

3.4 Oil Spill Contingency Planning Study. All the ports reviewed handle considerable quantities of petroleum hydrocarbons, as both crude oil and refined products, with increases projected in both the volume and size of the carriers being handled. In some cases, for example, Xiamen and Ningbo, berth space is inadequate for handling very large carriers; they have to be off-loaded while at anchorage. This activity has led the port authorities to become very concerned over the potential for product spillage or accidental leakage and their inability to clean up spills. The project provides oil booms for the ports to handle such situations. Only DPA and SPA have developed some sort of consistent oil spill contingency plans, but they are not complete. All six port authorities need considerable assistance to prepare modern oil spill contingency and response plans.

3.5 Significant expenditures for spill response equipment and chemicals are inappropriate at this time and should be deferred until completion of a program of planning and training. The project will provide assistance to undertake a three-phase study to (a) develop oil spill contingency plans for the six ports using a generic model that can then be used to develop specific plans for each port; (b) undertake training of staff in the design and implementation of oil spill contingency plans; and (c) identify response equipment appropriate to the needs of the six ports. The experts to be hired under the project will work closely with MOC to develop a national scenario for oil spill response. This scenario would ensure nationwide consistency in planning, response capability, response training, and availability of personnel and equipment. Each port will maintain and operate a "standard" set of equipment that could be combined with resources from other ports in the event of a major spill. During negotiations, assurances were obtained from all six ports that they will adopt an oil spill contingency plan by July 31, 1994, developed according to terms of reference agreed with the Association (Draft Scope of Work, see Attachment 3).

3.6 Large Marine Ecosystem (LME) Activity. The Yellow Sea, one of the world's LMEs, is also an important international waterway for shipping. It is important in the long term to protect the quality of the marine ecosystem of the Yellow Sea and, if possible, to work to improve it. While various factors influence the biomass yields of the LMEs, and all of these are not fully known, sufficient knowledge and expertise are available to assist in the maintenance of their quality. To put a system in place for this purpose, however, requires long-term commitment both to establish a monitoring and remedial system and to operate it subsequently. This commitment will have to come from all the countries sharing in the Yellow Sea LME, namely, China, Japan and Korea. However, this is an activity falling outside the scope of port activities and not directly related to it, and invariably in the jurisdiction of an agency different from the one dealing with ports. (In China, MOC has jurisdiction over the ports, but SOA is an independent GOC agency.) However,

LME activity would be a logical follow-on to the ship waste disposal project, and the Bank Group has proposed to GOC that this be undertaken as a separate exercise. The project will include assistance in developing the terms of reference and detailed work program (Attachment 4) for such activity, which will be undertaken as a separate exercise. Various sources of funding for this regional program are being explored, i.e., UNDP, NOAA, technical assistance credit, etc. Assurances were obtained from GOC during negotiations that it will prepare, in consultation with the Association, the TOR and the complete program for a study of the Yellow Sea marine ecosystem by December 31, 1992.

3.7 Chemically Contaminated Water Treatment Study. The discharge of chemically contaminated waters is controlled by Annex 2 of MARPOL. With the exception of the Ningbo Port Authority, none of the ports has facilities to receive and treat ballast or bilge waters from bulk chemical carriers, nor to treat contaminated waters resulting from the washing of containers, due to its small quantities. However, bulk chemical cargo is becoming a major cargo for the six ports reviewed with the exception of Xiamen, and all the Port Authorities need to treat chemically contaminated waters.

3.8 The project will include a study to assess and develop a treatment system for chemically contaminated water (see Draft Scope of Work in Attachment 5). The study will be divided into three phases: (a) assessment of the nature and quantities of chemical cargoes now or projected to be handled through the ports; (b) joint development with staff from MOC and NEPA to designate effluent criteria for the chemical substances contaminating the ballast, bilge and wash waters; and (c) identification and design of a treatment system that will be "generic" and modular in structure so that it can be tailored to handle best the different types and quantities of chemicals handled. During negotiations, assurances were obtained from GOC that it will carry out the above-mentioned study according to TOR agreed with the Association, by December 31, 1993, and implement its recommendations in consultation with the Association.

Ports' Component

3.9 Oil-Contaminated Waters (MARPOL Annex 1). For each port, the necessary facilities were identified: they must be able to receive, treat, and process waters from oil-contaminated ballast, bilge/engine rooms, and tank wash from both crude and refined product carriers (see Attachment 2). In some cases, the port requirements were small enough to be adequately handled through the use of one or more self-propelled processing barges; in other cases, the requirements were larger and would be met through the use of a land-based facility. In either case, the oil-contaminated waters would be processed through a multistage processor consisting of gravity-based settling tanks, air floatation tanks, and adsorption filters to remove hydrocarbons and permit the operating agency to meet China's current receiving water criterion of 10 mg/L (ppm). All treatment facilities would include automatic monitoring systems to permit continuous treatment and discharge of waters.

3.10 The project will also provide sampling and testing equipment to permit the monitoring stations of the Port Environment Protection Bureaus and the Harbor Superintendency to monitor the treatment facilities to ensure their proper operation. The Port Environment Protection Bureaus will coordinate with local facilities of the SOA in such matters as sampling protocols, testing methodologies, and quality assurance of data programs.

3.11 Sanitary Sewage (MARPOL Annex 4). The provision of sanitary sewage facilities in the ports to receive and treat sewage from the ships will serve as a

model for both the adjacent municipality and also for other municipalities and ports in China. In most cases, the port facilities would be located in municipal units that do not provide at present central collection and treatment facilities. In the ports of Dalian and Shanghai, the project would provide appropriate piping and valves to connect ship offloading facilities, at all terminals, to existing municipal collection and treatment systems. In the other four ports, the project would provide offloading facilities connected to secondary treatment package sewage plants. They would be chosen so as to be readily expandable to accommodate increases in shipping or to provide facilities for wastes from the landside of the port operations.

3.12 The treatment facilities will permit treatment to secondary treatment levels, i.e, they will remove most solids and oxygen-demand materials, a portion of the nutrients, and a portion of associated contaminants. Effluents will be chlorinated to kill any associated bacteria and pathogens.

3.13 The project will also provide sampling and laboratory testing equipment to permit the monitoring stations of the Port Environmental Protection Bureaus to monitor the treatment facilities to ensure their proper operation. These tests will include biochemical and chemical oxygen demands, dissolved oxygen, suspended solids, turbidity, coliform bacteria, and select pathogens.

3.14 Garbage and Solid Wastes (MARPOL Annex 5). Of the six ports reviewed, only DPA had an adequate program for the receipt and disposal of garbage and solid wastes. The other port authorities acknowledged that their facilities were adequate to receive and treat, at best, 20 percent of the projected garbage and solid wastes. The project will provide for the purchase of suitable collection barges and/or trucks for the port authorities and for the construction of incinerators for the destruction of materials that cannot be recycled or made into acceptable compost. The solid waste receiving and disposal facilities will form part of an overall solid waste management plan for the port.

3.15 Disposal of garbage and solid wastes has often proved to be a very contentious issue for municipal units everywhere. As part of the project, the Association will work closely with the port authorities to ensure that the proposed port solid waste management plant can be integrated with the municipal solid waste management plans. In each case, the port authority will develop a solid waste management plan for ships' wastes and for other solid wastes generated in the port. Where possible, municipally owned and operated incineration, compost, and/or landfill facilities will be used to dispose of solid wastes (e.g., in Dalian and Ningbo). In cases where the port operations are separate from the main municipal units (e.g., in Tianjin or Guangzhou), the port authorities will construct and operate their own disposal facilities. Materials that can be recycled will be first separated out; the remainder are proposed to be incinerated, since landfill space is highly restricted. In the case of Shanghai, where port operations are very large, the port authority will also construct and operate its own facilities. Assurances were obtained from the six Port Authorities that they will develop their respective waste management plans by December 31, 1992, send them for the Association's review and comments, and adopt and implement them by December 31, 1994, taking into account the Association's comments.

3.16 Incinerators will be designed to meet the criteria for preservation of air quality. Resultant fly and bottom ash will be disposed of in appropriate landfill facilities after testing to ensure that contaminants are suitably immobilized. The project includes sampling and laboratory testing equipment to permit the monitoring stations of the Port Environment Protection Bureaus to monitor the treatment facilities to ensure their proper operation. These tests will include

air quality monitoring (both ambient and stack sampling) and leachate testing of the fly and bottom ash.

3.17 Environment Monitoring Capability. Under the GEF provisions, the cost-effectiveness of the proposed facilities are to be determined initially on the basis of physical rather than monetary measures of global benefits (as the latter are almost impossible to quantify and measure). In addition, the GEF-funded projects should operate in an institutional framework which is favorable to the achievement of broad GEF objectives of global environment improvement.

3.18 To provide an adequate means of assessing the physical benefits of the proposed facilities, the project would provide for the purchase of suitable sampling and laboratory testing equipment to upgrade or complement existing capabilities within the Environmental Monitoring Stations of the Port Environmental Protection Bureaus. A detailed list of proposed laboratory equipment is available in the project file. With the exception of XPA, all the ports have the appropriate staff and institutional arrangements in place to acquire and operate the equipment appropriate to the monitoring requirements associated with the proposed reception and treatment facilities. As detailed later (para. 3.21-3.23), XPA will be provided technical assistance to develop, set up and staff an Environment Protection Bureau.

3.19 Monitoring activities and responsibilities can be summarized as follows:

(a) LME study (para. 3.5 above) would eventually monitor international waters in the Yellow Sea and would be the responsibility of SOA.

(b) Monitoring of coastal waters outside the ports' jurisdiction would be the responsibility of SOA.

(c) SEATRACK basic information would be the responsibility of the port's EPBs with feed-in to a central office for control by HSA at MOC headquarters in Beijing.

(d) Monitoring the water quality inside the ports' jurisdiction would be the responsibility of HSA in collaboration with the ports' EPBs.

(e) Monitoring the quality of the water discharge and air on-land would be the responsibility of the ports' EPBs.

The water monitoring activities would assess the quality of effluents from the facilities, of the receiving waters into which the effluents are discharged (port waters) and of waters which are no longer impacted as a result of the project (adjacent coastal waters and sea lanes). The air monitoring activities would include assessment of relevant stack emissions and air quality within the adjacent surrounding areas. Monitoring parameters would be selected to reflect the process being assessed (e.g., petroleum hydrocarbons in discharges from oil-contaminated water treatment facilities).

3.20 One objective of this project is to promote working relationships between basic monitoring agencies, such as the National Environmental Protection Agency (NEPA), the State Oceanographic Administration (SOA), and the Port Environmental Monitoring Stations. This cooperation would include development of common sampling and sample handling protocols, laboratory test methodologies, and quality assurance protocols. The development of common techniques would facilitate a merger of environmental data bases that would further the capability of NEPA and SOA improve the marine environment quality reporting. During negotiations, assurances were obtained from GOC and the Port Authorities that a coordinating team of

representatives of the concerned Port Authority, EPB, NEPA, and SOA will be established at each port, as agreed with the Association, by December 31, 1992.

3.21 Technical Assistance to Xiamen Port Authority. All the Port Authorities, with the exception of XPA, have institutional arrangements, typically organized as an Environmental Protection Bureau reporting to a deputy director. These bureaus are responsible for all activities related to the full range of environmental issues, including air and water quality and the operation of pollution control facilities and associated monitoring.

3.22 XPA has developed an organizational outline for an Environmental Protection bureau, but at present has neither the resources nor the in-house capability to implement the plan. Tasks which might be carried out by such a bureau are undertaken by port staff as necessary on a temporary assignment basis.

3.23 As part of the project, technical assistance will be provided to XPA to establish the proposed Bureau (see Draft Scope of Work in Attachment 6). This assistance will include recommendations on staffing requirements, staff recruitment and training, facility and equipment needs, and the setting up of an Environmental Monitoring and Laboratory facility for the port. During negotiations, assurances were obtained from XPA that it will establish, by June 30, 1993, an adequately staffed Environmental Protection Bureau, to supervise and operate the proposed ships' waste disposal facilities.

C. Project Cost

3.24 Cost Estimates. The estimated cost of the project, in January 1992 prices, is $64.8 million (Table 3). This includes price escalation contingencies of $2.54 million and a physical contingency allowance of $2.34 million. The cost estimates are based on the cost of similar equipment and facilities as well as designs prepared by the ports. The technical assistance will involve approximately 38 staff-months. The project is exempt from import duties and taxes. The costs are summarized below:

	Local	Foreign	Total	Local	Foreign	Total
	----- $ million -----			---- RMB million ----		
National Component						
Monitoring and tracking	0.65	1.35	2.00	3.49	7.25	10.74
Technical assistance	-	0.70	0.70	-	3.76	3.76
Subtotal	0.65	2.05	2.70	3.49	11.01	14.50
Ports' Component						
Disposal facilities	38.13	19.06	57.19	204.76	102.35	307.11
Technical assistance	-	0.03	0.03	-	0.16	0.16
Subtotal	38.13	19.09	57.22	204.76	102.51	307.27
Base cost	38.78	21.14	59.92	208.25	113.52	321.77
Contingencies:						
Physical	1.48	0.86	2.34	7.95	4.62	12.57
Price	1.54	1.00	2.54	8.27	5.37	13.64
Total cost	41.80	23.00	64.80	224.47	123.51	347.98

D. Financing

3.25 The project financing plan is summarized below. It includes concessional funding from the Global Environment Trust Fund (GEF) of $30 million and an IDA Credit equivalent to $15 million, with the remainder covered by GOC and the respective Port Authorities. GOC would be the borrower and would on-lend the proceeds to the respective Port Authorities, except for money to be retained by MOC for the national component. During negotiations, assurances were obtained from GOC that the credit proceeds (except for a small amount to be retained for MOC) will be on-lent to the Port Authorities on terms and conditions satisfactory to the Association, namely 1.5 percent interest per annum, repayable in 15 years, with 5 years' grace period. The Port Authorities will bear the commitment fee and the foreign exchange risk.

	Local	Foreign	Total
	---	$ million	---
PRC	19.8	-	19.8
GEF	14.6	15.4	30.0
IDA	7.4	7.6	15.0
Total	41.8	23.0	64.8

E. Organization and Management

3.26 Project Implementation. The project would be implemented and operated by the Environmental Protection Bureaus of the respective Port Authorities. The project implementation schedule is shown in Schedule 2. The studies to develop oil spill contingency planning and chemically contaminated water treatment processes would be implemented by the Environment Protection Department of MOC working in conjunction with the Environment Protection Bureaus of the six ports. The technical assistance to the Xiamen Port Authority would be implemented by the Office of the Director of XPA. The monitoring of the waters will be the responsibility of the EPBs, NEPB, HSA, and SOA, each in its jurisdiction as previously outlined. Specifications for the equipment needed are being prepared by the respective Port Authorities under MOC guidance. The project will be closely supervised to ensure satisfactory implementation (see para. 3.32); the first-year will, in particular, require extra supervision effort to ensure timely preparation of specifications and issuance of tenders.

3.27 Procurement. Civil works contracts will be awarded through local competitive bidding (LCB), according to procedures acceptable to the Association, since they constitute small contracts which would not attract international contractors. Very small contracts for civil works, to be agreed with the Association, each costing $200,000 equivalent or less, and amounting to less than $2.0 million equivalent in total, would be procured under contracts after evaluation and comparison of quotations solicited from at least three suppliers under procedures acceptable to the Association. Contracts for equipment valued at more than $200,000 equivalent will be procured through international competitive bidding (ICB) in accordance with Bank Group guidelines. Qualifying domestic manufacturers of goods will receive a preference in bid

Item	Procurement Method				
	ICB	LCB	Other	NIF	Total
			$ million		
Civil works	-	10.85	2.00	6.92	19.77
(IDA)	-	(1.40)	-	-	(1.40)
(GEF)	-	(1.53)	(0.54)	-	(2.07)
Equipment	38.80	-	2.00	3.50	44.30
(IDA)	(12.60)	-	(1.00)	-	(13.60)
(GEF)	(26.20)	-	(1.00)	-	(27.20)
Technical assistance	-	-	0.73	-	0.73
(IDA)	-	-	-	-	-
(GEF)	-	-	(0.73)	-	(0.73)
Total	38.80	10.85	4.73	10.42	64.80
(IDA)	(12.60)	(1.40)	(1.00)		(15.00)
(GEF)	(26.20)	(1.53)	(2.27)		(30.00)

Note: Items in parentheses represent the portions financed by the IDA credit and GEF grant, respectively.
NIF: Non-IDA/GEF Financed.

evaluation of 15 percent of the CIF price or the amount of the import duty, whichever is lower. Some small items, to be agreed with the Association, each costing less than $200,000 equivalent, and amounting to less than $2 million equivalent in total, would be procured under contracts after evaluation and comparison of quotations solicited from at least three suppliers under procedures acceptable to the Association. Contracts to be awarded under ICB, which would not be less than 60 percent of the credit value, will be subject to the Association's prior review of procurement documentation, as will proposed contract awards. Consultants for the technical assistance will be recruited in accordance with Bank Group guidelines. The project is expected to be completed by June 30, 1995, and the closing date would be June 30, 1996.

3.28 Disbursements. All technical assistance and training costs would be funded from GEF. Other expenditures would be covered from the IDA credit and from the GEF grant and will cover (a) 27 percent of expenditures on civil works; (b) 100 percent of foreign expenditures on imported goods, 100 percent of expenditures for locally manufactured goods at ex-factory prices, and 75 percent of local expenditures for other items procured locally; and (c) 100 percent for consultants' services and training. Disbursements will be on the basis of full documentation except for reimbursement of expenditures for (technical assistance and training and) contracts for civil works and goods valued at less than $200,000 each, for which disbursements will be made against statements of expenditure; supporting documents will be retained by the six Port Authorities and made available for inspection by IDA staff. The estimated disbursements are shown in Schedule C. To facilitate disbursement, a joint special account to be maintained in US dollars would be established in a bank on terms and conditions satisfactory to the Association. The authorized allocation to the Special Account is $3.0 million, representing four months' average project expenditures to be channelled through the account. Replenishment would be made quarterly or whenever the account is drawn down by about 50 percent of the initial deposit.

3.29 Accounts and Audit. The accounting and record-keeping activities at each of the six ports and the annual audits of their accounts by the State Audit Administration are regularly being reviewed by Bank Group staff as part of the supervision of ongoing projects. During negotiations, assurances were obtained from each port that (a) it will continue to submit its audited annual financial statements to the Association not later than six months after the end of each financial year, and (b) it will keep the accounts of the project and will also submit to IDA the audited accounts of the annual project expenditures not later than six months after the end of each financial year.

3.30 Ecology and Environment. Implementation of the project will provide a net benefit to the local and global environment through the decrease in discharges of ships' wastes in international waters adjacent to the coast of China. To avoid simple transfer of the problem from the open sea to the port, the project design has taken into consideration the need to ensure that all wastes received are properly handled and treated: (a) residues from the treatment of oily wastes will be recycled as many as possible or used as fuel in heating plants or brick kilns; (b) sanitary sewage will be processed through secondary treatment plants, as is now typically undertaken at the more modern terminal facilities in the ports; (c) garbage and solid wastes will be sorted with maximum possible recovery of recyclable materials or materials used for compost.

3.31 Under current Chinese law, such facilities will have to comply with environmental assessment procedures, including provision of an Environmental Protection and Compliance Plan within an Environmental Management Structure. The designs and bid documents for the waste collection and/or disposal facilities will be prepared by the Design Institutes and will follow GOC environment criteria and guidelines and will be reviewed by the Bank. These reviews will be undertaken by the appropriate Port Environmental Protection Bureaus. Liaison will be made with the appropriate Municipal Protection Bureau to ensure that the designs meet current emission and effluent criteria. Standard operating practice manuals issued by the port EPB will include elements of occupational health and safety for port workers operating the treatment facilities.

3.32 Reporting and Evaluation. The project implementation schedule shows key project activities and key project monitoring indicators. Quarterly progress reports will be submitted by the respective Port Authorities according to a format acceptable to MOC and the Association; this was agreed during negotiations. A final project completion report will be prepared by MOC and submitted to the Association within six months of completion of the project.

IV. FINANCIAL EVALUATION AND JUSTIFICATION

Financial Analysis

4.1 As already mentioned, the ports included in the project are already being assisted under ongoing Bank Group loans and credits. Under the relevant loan/credit agreements, the individual Port Authorities are required to generate sufficient funds internally from their operating revenues to cover their debt service obligations, remittances to the Government, and allocations to special funds. The ports are in compliance with this requirement, and their financial performance continues to be good, despite some variations in traffic performance for reasons beyond their control.

4.2 Key indicators summarizing the forecast funds flow for 1992 through 1995 are shown below. Details of the forecast, given in Tables 5 through 11, show that the financial situation of the ports will be satisfactory and they will continue to earn healthy surpluses. The ports are expected to continue to generate sufficient funds internally to finance their ongoing and reasonable future capital investment needs, including the provision of funds for the timely implementation and subsequent operation of facilities included in the project. During 1992-95, each of the Port Authority's contribution towards its share of the project costs is expected to be met from the surpluses of its regular port operations. The facilities financed under the project are expected to start operations in 1995. The cash generation financial covenants under the respective loan/credit agreements relating to ongoing projects at each of the ports will continue to hold good. Assumptions used in the financial forecasts are given in Attachment 7.

PROJECTED FUNDS FLOW STATEMENT FOR THE PROJECT--SUMMARY
(RMB million)

	Tianjin	Huangpu	Dalian	Shanghai	Ningbo	Xiamen
Proposed Project						
Capital investment (proposed project)	50.9	53.6	20.0	131.6	44.4	34.0
External financing	35.7	37.6	14.0	92.4	31.2	23.9
Ports contribution	15.2	16.0	6.0	39.2	13.2	10.1
Net funds flow from proposed project in 1995	4.5	4.8	1.8	10.3	3.9	4.3
Surplus (deficit)	(10.7)	(11.2)	(4.2)	(28.9)	(9.3)	(5.8)
Regular port operations						
Net funds flow:						
Surplus (deficit)	109.1	81.5	79.7	302.6	100.9	80.5
Consolidated:						
Net surplus/ (deficit)	98.4	70.3	75.5	273.7	91.6	74.7

4.3 Since the proposed facilities and their operation and maintenance are separate from the usual port activities, they would be treated as separate cost and revenue centers. Therefore, in order to maintain the financial viability of this specific activity of handling ship wastes, new tariffs based on cost recovery need to be developed for each port under a uniform tariff structure. The revenue projections relating to the proposed facilities for the year 1995 used in the accompanying tables are notional and are based on the concept of full cost recovery. During negotiations, assurance were obtained from GOC and the six Port Authorities that an appropriate tariff sched-

ule based on cost recovery for each type of waste handling and disposal services would be developed on the basis of terms of reference agreed with the Association, submitted to the Association by June 30, 1994, for its comments, and, taking into account the Association's comments, introduced in each of the ports by June 30, 1995. A draft of the TOR is given in Attachment 8.

Benefits

4.4 The six ports selected for the project handle some 90 percent of the international shipping serving the sea-borne foreign trade of the People's Republic of China. In addition, these ports serve a significant portion of the country's domestic maritime traffic. In several of the ports, the lack or poor capability of waste reception facilities obliges the Port Authorities to allow ships to discharge their wastes at sea or has created considerable delays in serving the ships. This contributes to port inefficiency and to pollution of both international and Chinese coastal waters. An economic return analysis has not been attempted, as the benefits to China (and the international community) are not directly measurable. However, provision of the proposed facilities should contribute to a major improvement to the marine environment quality and serve as a model for establishing similar facilities in other Chinese ports.

Risks

4.5 The main risks relate to project implementation and cost recovery. As this is a substantially new activity for most of the ports, technical assistance through close project supervision will be provided to ensure satisfactory implementation. As to cost recovery, PRC's record in the matter of introducing adequate cost recovery mechanisms has so far been good and GOC has agreed that there would be no difficulty in the ports introducing a tariff scheduled based on cost recovery for the new services.

V. AGREEMENTS REACHED AND RECOMMENDATION

5.1 During negotiations, assurances were obtained from the Government of the People's Republic of China and the Port Authorities on the following:

(a) GOC:

(i) GOC will prepare by December 31, 1992, in consultation with the Association, the TOR and the complete program for a study of the Yellow Sea marine ecosystem (para. 3.6);

(ii) the chemically contaminated water treatment study will be completed by December 31, 1993, and the results implemented in consultation with the Association (para. 3.8);

(iii) GOC will on-lend the proceeds of the credit to the respective Port Authorities on terms and conditions satisfactory to the Association (para. 3.25);

(b) Port Authorities:

(i) the Guangzhou Port Authority will enter into arrangements satisfactory to the Association with the Guangzhou Bureau of Maritime Transport Administration to handle the oily ballast and bilge waters for all port users at the proposed BOMTA facility at Xin Zhao (this will eliminate the need for a separate GPA facility) (para. 2.16);

(ii) all six ports will have prepared and adopted an oil spill contingency plan by July 31, 1994 (para. 3.5);

(iii) all six Port Authorities will develop their respective waste management plans by December 31, 1992, send them for the Association's review and comments, and implement them, taking into account the Association's comments, by December 31, 1994 (para. 3.15);

(iv) the Xiamen Port Authority will establish, by June 30, 1993, an adequately staffed Environmental Protection Bureau to supervise and operate the proposed ships' waste disposal facilities (para. 3.23); and

(v) the six Port Authorities will submit quarterly progress reports on the project according to a format acceptable to the Association (para. 3.32).

(c) GOC and the Port Authorities jointly:

(i) GOC and each of the Port Authorities will set up a coordinating team of representatives of the concerned Port Authority, EPA, NEPA, and SOA, as agreed with the Association, by December 31, 1992 (para. 3.20); and

(ii) GOC and the Port Authorities will submit to the Association, by June 30, 1994, a proposal for an appropriate tariff schedule, based on cost recovery, for the services of the waste disposal facilities; and this will be introduced by all six ports by

June 30, 1995, taking into account the Association's comments (para. 4.3).

5.2 Approval of the credit agreement by China's State Council, fulfillment of conditions precedent to the GET Grant Agreement, and execution of subsidiary loan agreements between the Government and DPA, TPA, SPA, NPA, GPA and XPA, satisfactory to the Association, are conditions of effectiveness of the credit.

SCHEDULE A

CHINA

SHIP WASTE DISPOSAL PROJECT

Documents in the Project File

1. Dalian Port Project, SAR No. 6588-CHA, January 5, 1988

2. Tianjin Port Project, SAR No. 5856-CHA, March 17, 1986

3. (i) Ningbo and Shanghai Ports Project, Shanghai Port, SAR No. 7257-CHA, November 16, 1988

   (ii) Ningbo Port, SAR No. 7297-CHA, November 16, 1988

4. Huangpu Port Project, SAR No. 6230-CHA, August 28, 1987

5. Xiamen Port Project, SAR No. 7296-CHA, November 16, 1988

6. Detailed List of Laboratory Equipment to be Funded under the Project.

7. Laws and regulations in China regarding the protection of the environment.

SCHEDULE B

CHINA

SHIP WASTE DISPOSAL PROJECT

Project Implementation Schedule

Action	Responsibility	Starting Date	Completion Date
1. Oil boom materials			
material identification	Port Authorities	05/01/92	08/01/92
material sourcing	Port Authorities	07/01/92	09/01/92
approve purchase	MOC/Port Authorities	09/01/92	10/01/92
call ICB tenders	Port Authorities	10/01/92	03/01/93
purchase equipment	Port Authorities	03/01/93	09/01/93
2. Oil water treatment facilities			
prepare plans	Port Authorities	05/01/92	09/01/92
prepare construction specifications	Port Authorities	09/01/92	12/01/92
approve plans	MOC/Port Authorities	12/01/92	01/01/93
call LCB tenders	Port Authorities	02/01/93	04/01/93
call ICB tenders	Port Authorities	02/01/93	06/01/93
initiate construction	Port Authorities	08/01/93	12/01/94
purchase equipment	Port Authorities	08/01/94	10/01/94
install equipment	Port Authorities	10/01/94	02/01/95
3. Sewage systems			
prepare plans	Port Authorities	05/01/92	09/01/92
prepare construction specifications	Port Authorities	09/01/92	11/01/92
approve plans	MOC/Port Authorities	12/01/92	02/01/93
call LCB tenders	Port Authorities	03/01/93	06/01/93
call ICB tenders	Port Authorities	03/01/93	08/01/93
initiate construction	Port Authorities	07/01/93	07/01/94
purchase equipment	Port Authorities	03/01/93	01/01/94
install equipment	Port Authorities	01/01/94	04/01/94
4. Garbage systems			
prepare plans	Port Authorities	05/01/92	08/01/92
prepare construction specifications	Port Authorities	07/01/92	09/01/92
approve plans	MOC/Port Authorities	09/01/92	11/01/92

Action	Responsibility	Starting Date	Completion Date
call LCB tenders	Port Authorities	11/01/92	03/01/93
call ICB tenders	Port Authorities	11/01/92	04/01/93
initiate construction	Port Authorities	04/01/93	04/01/94
purchase equipment	Port Authorities	05/01/93	12/01/93
install equipment	Port Authorities	01/01/94	04/01/94
5. Environmental monitoring stations			
prepare plans	Port Authorities	05/01/92	08/01/92
prepare construction specifications	Port Authorities	07/01/92	09/01/92
approve plans	MOC/Port Authorities	09/01/92	10/01/92
call LCB tenders	Port Authorities	10/01/92	01/01/93
call ICB tenders	Port Authorities	10/01/92	02/01/93
initiate construction	Port Authorities	12/01/92	12/01/93
purchase equipment	Port Authorities	02/01/93	12/01/93
install equipment	Port Authorities	12/01/93	02/01/94
staff training	Port Authorities	06/01/93	02/01/94
6. Oil Spill Contingency Planning Study			
select consultant	MOC/IDA	07/01/92	10/01/92
developing plan	MOC/consultant	01/01/93	05/01/93
staff training	MOC/consultant	06/01/93	12/01/93
equipment selection	MOC/consultant	01/01/94	05/01/94
7. Chemically Contaminated Waters Study			
select consultant	MOC/IDA	07/01/92	10/01/92
assess problem	MOC/consultant	11/01/92	01/01/93
develop effluent criteria	MOC/consultant	01/01/93	04/01/93
design system	MOC/consultant	04/01/93	08/01/94
8. Technical Assistance to XPA			
select consultant	XPA/MOC/IDA	05/01/92	08/01/92
prepare plan	XPA/consultant	08/01/92	09/01/92
staff training	XPA/consultant	12/01/92	03/01/93
program implementation	XPA	03/01/93	06/01/93

SCHEDULE C

CHINA

SHIP WASTE DISPOSAL PROJECT

Estimated Schedule of Disbursements /a /b

IDA Fiscal Year & Quarter	IDA		GEF		Percent IDA/GEF	Cumulative Disbursement Profile for Transport Projects in China
	Quarter	Cumulative	Quarter	Cumulative		
1993						
12/31/92	-	-	3.0	3.0	6.6	0.0
03/31/92	-	-	-	3.0	6.6	
06/30/92	-	-	3.0	6.0	13.2	6.0
1994						
09/30/93	-	-	6.0	12.0	26.7	
12/31/93	-	-	6.0	18.0	40.0	11.0
03/31/94	-	-	6.0	24.0	53.3	
06/30/94	-	-	2.0	26.0	57.8	16.0
1995						
09/30/94	3.0	3.0	2.0	28.0	68.9	
12/31/94	3.0	6.0	2.0	30.0	80.0	24.0
03/31/95	3.0	9.0	-	30.0	86.7	
06/30/95	1.0	10.0	-	30.0	88.9	31.0
1996						
09/30/95	3.0	13.0	-	30.0	95.6	
12/31/95	2.0	15.0	-	30.0	100.0	57.0

/a Because of limited scope of works which are supplementary to ongoing Bank Group projects, this credit is expected to be disbursed much faster than country or regional disbursement profiles. Project completion is expected by June 30, 1995, and the closing date is June 30, 1996.

/b Disbursements from the IDA credit will begin following completion of disbursements from the GEF grant.

CHINA

SHIP WASTE DISPOSAL PROJECT

International Convention for the Prevention of Marine Pollution

1. The International Convention for the Prevention of Marine Pollution, known simply as MARPOL 73/78, has currently five annexes covering discharges from ships. These are:

- Annex I: Oily wastes - such as ballast water and slops from oil tankers; oily bilge water from engine room and other spaces; fuel residues; and waste oil.
- Annex II: Noxious liquid substances in bulk - tank residues after discharge of cargo.
- Annex III: Harmful substances carried in packaged form, in freight containers, portable tanks.
- Annex IV: Sewage - This annex is not yet in force because of limited sewage reception facilities at ports worldwide at present.
- Annex V: Garbage - including food wastes, plastics, oily rags, packing materials and dunnage.

Certain sea areas have been designated by International Maritime Organization (IMO) through the Marine Environment Protection Committee (MEPC) as "Special Areas" in view of their particular sensitivity to pollution and the need to protect very valuable marine areas, species and shorelines. Currently, the Mediterranean, the North Sea, the Gulf of Mexico and the Wider Caribbean are amongst areas designated as special. Within these areas only certain wastes can be discharged from ships depending on which MARPOL 73/78 Annex is concerned.

CHINA

SHIP WASTE DISPOSAL PROJECT

Summary of Present Situation and Recommended Actions

Item	Dalian	Tianjin	Shanghai	Ningbo	Quangzhou	Xiamen
Oily Water						
Current situation	Ballast water treatment at Crude Oil Terminal; bilge water and tank wash treatment at Refined Oil Terminal. Facilities 15-yrs old and need refurbishing;, additional requirements projected.	Treatment vessel only usable 60% of year. Treatment capacity below requirements.	BOMTA has converted tanker treating 2000 tons/day. SPA has limited number of treatment barges.	Refinery terminal treats its own ballast waters (10,000 tons/yr). Large tankers at anchorage discharge at sea, as port facilities are inadequate.	BOMTA treats its own ballast waters using a converted tanker (400 tons/hr). Port handles bilge waters using small collection vessels and treats at various private facilities.	Port has no reception or treatment facilities.
Recommended action	Refurbish existing facilities to restore processing rate at Crude Terminal to 1000 tons/hr.; Refined Terminal to 400 tons/hr. Purchase new spill containment booms for routine usage during on/off-loading. New automatic monitoring equipment for both Terminals.	Refurbish existing barge to restore treatment capacity to 30 tons/hr. Port to have access to proposed Oil Terminal ballast water treatment facility. Purchase spill containment booms for routine usage during on/off-loading.	Port to build new land-based treatment facility for 300,000 tons/yr. with room to expand to 600,000 tons (at Waigaoqiao). Convert another tanker for ballast-water processing (300,000 tons/yr. at Liuhukou). Purchase spill containment booms for routine usage during on/off-loading.	Port to build new land-based treatment facility for ballast waters (at Beilun). Port to refurbish existing 60-tonne treatment barge. Port to purchase 300-500-tonne barge. Purchase spill containment booms for routine usage during on/off-loading.	Since BOMTA is building new land-based facility, port does not need its own facility. Port to purchase new oil collection barge and treat at BOMTA facility. Purchase spill containment booms for routine usage during on/off-loading.	Port to purchase new oil collection and treatment barge (200-tonne capacity). Purchase spill containment booms for routine usage during on/off-loading.
Chemically Contaminated Waters						
Current situation	No treatment facilities	No treatment facilities	No treatment facilities for ballast waters; small-scale treatment for container wash.	Treatment facilities for ballast waters at Bulk Chemical Plant (Zhenhai). No treatment for container wash at Beilun or Zhenhai. No need to upgrade Zhenhai facilities as traffic too low.	No treatment facilities	No treatment facilities
Recommended action	Design facilities for organic contaminants.	Design facilities for organic contaminants from ballast waters at proposed Chemical Terminal.	Design facilities for organic contaminants from ballast waters.		No facilities to be built at this time. Future plans for chemical plants and Dangerous Cargo Terminal identify need for staff training.	No facilities to be built at this time.

Item	Dalian	Tianjin	Shanghai	Ningbo	Guangzhou	Xiamen
Sanitary Sewage						
Current situation	City has treatment plant; Port has no facilities for ships.	Municipality has no treatment plant; Port has no facilities for ships.	Municipality has extensive collection and treatment system; Port has no facilities for ships.	Municipality has no facilities; Port unable to treat ships wastes.	Municipality has no facilities. Port unable to treat ships' wastes.	Municipality has no facilities. Port unable to treat ships' wastes.
Recommended action	Connect to City system.	Enlarge East Pier facility to accommodate ships' needs. Build new facility for South Side Terminals.	Connect terminals to City system to accommodate ships' needs.	Alteration of Iron Ore treatment facility for sewage at Beilun. Connect to proposed Zhenhai district and port system.	Purchase 2 collection barges (200-tonne capacity). Build secondary treatment plant at Hong Sheng Sha Island.	Build secondary treatment plant at Donggu Terminals.
Garbage						
Current situation	Adequate: Port transfers wastes to City system, where they are incinerated.	Garbage now barged to Municipal incinerator. Capacity inadequate.	Garbage now barged to Port incinerator. Capacity inadequate.	Garbage now barged to Zhenhai incinerator. Capacity inadequate.	Garbage now barged to small port incinerator. Capacity inadequate.	Garbage not collected.
Recommended action	None.	Purchase new barge (100-ton capacity).	Build two new incinerators.	Purchase new 50-ton capacity barge. Build new 2000 sq.m. handling facility at Zhenhai. Purchase 2 garbage trucks. Build new 10-tonnes/day incinerator.	Build new incinerator at Hong Sheng Sha. Capacity 20 tonnes/day.	Purchase 100-ton capacity collection barge. Build new incinerator; capacity 1 ton/day.
Oil-Spill Contingency						
Current situation	Plan developed; use old containment booms on routine basis; no other equipment for response.	No plan; do not use oil containment booms during off-loading; no equipment for response.	Plan developed, but not reviewed; do not use oil containment booms during off-loading; 2 old skimmers for spill response.	No plan developed; do not use oil containment booms during off-loading; no equipment for spill response.	No plan developed; do not use oil containment booms during off-loading; no equipment for spill response.	No plan developed; do not use oil containment booms during off-loading; no equipment for spill response.

Item	Dalian	Tianjin	Shanghai	Ningbo	Guangzhou	Xiamen
Recommended action	Review contingency plan. Purchase oil boom; slick lickers; absorbent; communications equipment; work boats.	Review contingency plan. Purchase oil boom; slick lickers; absorbent; communications equipment; work boats.	Review contingency plan. Purchase oil boom; slick lickers; absorbent; communications equipment; work boats.	Develop contingency plan. Purchase oil boom; slick lickers; absorbent; communications equipment; work boats.	Develop contingency plan. Purchase oil boom; slick lickers; absorbent; communications equipment; work boats.	Develop contingency plan. Purchase oil boom; slick lickers; absorbent; communications equipment; work boats.
Environment Laboratory						
Current Situation	Need additional oil testing equipment.	Limited to analytical and sampling equipment.	Old analytical and sampling equipment.	Limited laboratory and sampling equipment of Zhenhai.	No laboratory or sampling equipment.	No laboratory or sampling equipment.
Recommended action	Purchase oil testing equipment.	Purchase needed equipment.	Purchase needed equipment.	Purchase needed equipment.	Purchases needed equipment. Complete building.	Purchase needed equipment.

CHINA

SHIP WASTE DISPOSAL PROJECT

Note on Large Marine Ecosystem Study

Draft Scope of Work

1. LMEs, or Large Marine Ecosystems, are relatively large areas of the global exclusive economic zones, generally more than 200,000 km^2, characterized by unique bathymetry, hydrography, and productivity, within which marine populations have adapted to suitable reproductive, feeding and growth strategies. LMEs are thus naturally existing ecological units of ocean space.

2. On a global basis, nearly 95 percent of the biomass yields from the oceans are from the currently identified LMEs, currently some 50 in number. This demarcation provides a convenient and manageable mechanism for improved international cooperation in marine monitoring, modelling and management. Wile important work remains to be done in identifying the various forces which control biomass yields and fluctuations in individual LMEs, the expertise and technology needed to answer these questions is at hand. These are among areas that are becoming increasingly stressed from pollution, natural environment perturbation, and overexploitation of living resources.

3. The LME approach is being increasingly used by international agencies as a more manageable way of tackling ocean pollution problems, although this too has its drawbacks as some LMEs need the cooperative efforts of a very large number of countries; for example, the Caribbean Sea is shared by 38 countries. It is planned to initiate the application of this approach to the Yellow and China Seas under the proposed ship waste project.

Study Objectives

4. The objectives of the study would be to:

(a) assess the state of marine pollution;

(b) assess the impacts that coastal development activities, including the current ship waste disposal project, may have on the marine environment or on the protection and use of renewable marine resources on a sustainable basis; and

(c) develop a sound basis for continuous monitoring of the marine environment.

Scope of Work

5. Run the production-pollution-biodiversity monitoring module, which involves the use of continuous plankton recorders (CPR). CPR are towed behind ships-of-opportunity (commercial vessels) making quantitative collections of phytoplankton and zooplankton while also measuring up to 18 oceanographic variables including: temperature; turbidity; chlorophyll a; bioluminescence; petrogenic hydrocarbons; salinity; upwelling and downwelling irradiance; dissolved oxygen; and nitrates and nitrites. This suite of measurements, along with the plankton collections, allows oceanographers to determine the general

health and productivity of the ecosystem as well as providing indications of changes in biodiversity.

6. The monitoring program should include collection of comprehensive information on fish populations in the LME. This can be accomplished through the use of small, inexpensive chartered trawling vessels, hired locally, which collect samples of pelagic and demersal fishes. These fish are examined for gross pathology including tumors and lesions which have been shown in many other LMEs to be indicative of excessive marine pollution levels. In addition, fish age, growth and reproductive characteristics are determined. This provides information on general stock health and indicates whether fish resources in the LME are in a state of increase or decline. This type of information is particularly important in an LME such as the Yellow Sea where the human population depends very heavily upon local fish stocks as a source of healthful, inexpensive protein.

Schedules

7. Schedules of implementation should be prepared and adequate staffing provided for.

Cost Estimate

8. The cost estimate of the study should be detailed and explained to facilitate seeking assistance from international institutions.

CHINA

SHIP WASTE DISPOSAL PROJECT

Oil Spill Contingency Planning and Response Study

Draft Scope of Work

1. The proposed technical assistance and institutional development component for oil spill contingency planning and response supports China's program under MARPOL. While China and its ports have recognized the potential problems of oil spills, they lack the expertise to develop complete contingency plans, adequately train staff and select appropriate equipment. All of the ports reviewed handle considerable quantities of petroleum hydrocarbons, as both crude oil and refined products, with projected increases in both the volume and size of the carriers being handled. Table 1 provides data for the six ports for the past three years. Of the six ports surveyed, only DPA deploys oil booms around the tankers during loading and off-loading.

2. Contingency plans developed for the Ports of Dalian and Shanghai are elementary in concept and place emphasis on response organization and equipment needs. Identification of ecologically-sensitive areas, potential problems for water users (e.g., cooling water intakes, fishing areas), available staff and disposal of collected materials) has not been considered. Further, such plans have been developed in each port and therefore lack a consistency which a "generic" model would provide; i.e., each port has had to develop its own plan. Accordingly, this project would provide technical assistance to MOC to develop a national center under the Harbor Superintendency Branch which presently has the institutional authority to assume command of spill response. It is proposed that this agency would also assume responsibility for providing general guidance on contingency planning, staff training in both contingency planning and spill response, and provide a central "clearing house" for news and information. As necessary, this agency could also coordinate equipment and manpower from several ports in the event of a major spill.

3. The second task within this project will be the provision of technical assistance to develop a "generic" contingency plan and to tailor this plan to the specific needs of the six ports. This will provide two benefits: (a) provision of a "generic" plan which the Harbor Superintendency can then adapt to specific needs in conjunction with concerned port; and (b) training of the central agency and port staff during the development of these plans.

4. The third element is the provision of staff training in spill response. Although China is anxious to have the capability to respond to spills and leakage, it was recognized that many of the ports lacked staff trained in spill response and the use of spill response equipment and chemicals. Training manuals and videos will be used and information packages will remain with the central agency for translation and distribution to the Port Authorities.

5. With the completion of training of staff, the final phase of the technical assistance will consist of identification of equipment appropriate to the needs of each port. Efforts will be made to ensure nationwide consistency in equipment selection so that in the event of a major spill, manpower and equipment can be transferred to the spill site, thereby providing a very

large assemblage of equipment. Part of the equipment selection task will be the development of a schedule of training exercises, staff refresher courses, and staff upgrading courses.

6. The sub-project will be undertaken by consultants to be hired under the project for about 30 staff-months. An allocation of $450,000 is included in the project for this purpose.

CHINA

SHIP WASTE DISPOSAL PROJECT

Chemically-Contaminated Water Treatment Study

Draft Scope of Work

1. Import and export of chemical cargoes, as both bulk and as containerized cargo, is becoming an increasingly important cargo type for the six ports reviewed. Many of the actual or proposed cargoes are of a petrochemical base, such as benzene, xylene, toluene or chemical feedstocks for plastics or industrial goods manufacturing (e.g., alkane alcohols, ethylene glycol). This cargo increase introduces the problem of treatment and discharge of ballast, bilge and tank wash waters and wash waters from containers that are contaminated due to the chemical cargoes. Under MARPOL Annex 2, ports are obliged to provide adequate reception and treatment facilities. While the Port Authorities readily recognized the need for facilities, they lack the expertise to identify, install and operate appropriate facilities. There was also the problem of the variable nature of the cargoes handled; e.g., the Port of Dalian imports 17-20 different major chemicals.

2. Of the six project ports, only the Port of Ningbo has developed extensive reception and treatment facilities for chemically-contaminated waters. The facilities, located in the Zhenhai Terminals, are capable of neutralizing acids and treating volatile chemicals, such as benzene and more complex chemicals, such as ethylene glycol. However, the facility is presently used mostly for importing of cargoes, thus generating little need for the facility. This has resulted in deterioration of the equipment and a need for refurbishing.

3. Only the Port of Shanghai has developed simple exchange systems to treat water used to clean containers used for shipment of chemical cargoes. These systems have a small treatment capacity and are used primarily to remove traces of chemicals.

4. The proposed project will include a study to assess and develop a treatment system for chemically-contaminated waters. The study will be divided into three phases:

(a) assess the nature and quantities of chemical cargoes now or projected to be handled through the ports;

(b) joint development with staff from MOC and NEPA to designate effluent criteria for the chemical substances contaminating the ballast, bilge and wash waters;

(c) design a treatment system that will be "generic" and modular in structure, so that it can be tailored to best handle the different types and quantities of chemicals handled in each port.

5. The project will require consultant expertise to undertake the three tasks for approximately 16 staff-months. An allocation of $250,000 is included for this purpose.

CHINA

SHIP WASTE DISPOSAL PROJECT

Technical Assistance to Xiamen Port Authority

Draft Scope of Work

1. The Xiamen Port Authority does not have at present an Environmental Protection Bureau to undertake its portion of the project. However, XPA has developed the organizational outline for an Environmental Protection Bureau, but lacks the expertise and resources to recruit staff and implement an Environmental Monitoring Facility.

2. As part of the understandings on this project, XPA has agreed to establish and staff the proposed Environmental Protection Bureau. As part of this project, technical assistance will be given to XPA to assist in the completion of three tasks:

(a) identification of staffing requirements;

(b) staff training; and

(c) identification of facilities and equipment for the Environmental Monitoring and Laboratory facility.

3. The technical assistance will be provided by an expert/consultant hired for not more than two months to undertake the three tasks. A sum of $30,000 is included under the project for the purpose. Implementation of the recommended facilities is also provided for under the project.

SHIP WASTE DISPOSAL PROJECT

Assumptions Used in the Financial Evaluation

1. The updated financial information for years 1989 and 1990 has been obtained from audit reports and/or latest estimates.

2. The annual projections for years 1991 through 1995 are based on the above-updated financial information and are calculated as follows:

Operating revenues	:	SAR [3] growth rates
Operating expenses	:	SAR rates of increases
Interest expense	:	SAR updated
Non-operating items	:	SAR updated
Taxes and payments to state	:	Based on 1990 rate applied to future net operating incomes
Depreciation	:	SAR updated
State contribution	:	SAR updated
Borrowings	:	SAR updated
Applications	:	SAR Updated

3. The completed project facilities are expected to start operations in 1995 and the assumptions relating to operating expenses and interest and revenues are as follows:

Expenses

Operating and maintenance expenses	:	10% of capital investment costs
Depreciation	:	10% of capital investment costs
Interest	:	IDA credit relent at 5% p.a. for 20 years with 5 years grace

Revenues Based on full cost recovery

i.e., full annual operating and maintenance costs
full annual depreciation

Repayment of onlent IDA credit to start in year 1997, i.e., after 5-year grace period.

Ports' contribution to project investment costs - met from net funds flow of regular port operations.

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[3] Staff Appraisal Reports (SAR) referred to above are the following:

Tianjin Port (Ln 2689-CHA); SAR No. 5856 CHA)
Huangpu Port (Ln 2877-CHA; Cr 1845-CHA; SAR No. 6230-CHA)
Dalian Port (Ln 2907-CHA, Cr 1875-CHA; SAR No. 6588-CHA)
Shanghai Port (Ln 3006-CHA; SAR No. 7257-CHA)
Ningbo Port (Ln 3006-CHA; SAR No. 7297-CHA)
Xiamen Port (Ln 3007-CHA; SAR No. 7296-CHA)

CHINA

SHIP WASTE DISPOSAL PROJECT

Draft Terms of Reference for Establishing a Costing and Tariff System for Waste Reception and Disposal Services

I. INTRODUCTION

1. The Government of China (GOC) has decided to introduce a program of environmental measures in six ports, viz.: Tianjin, Huangpu, Dalian, Shanghai, Ningbo and Xiamen.

2. This will be achieved by providing operating facilities and systems in each port for the reception, treatment and disposal of ships' wastes in an environmentally sound manner in accordance with international conventions. An important requirement is that GOC and the Port Authorities operate the facilities in a financially viable manner, including the introduction of a tariff schedule based on full-cost recovery and appropriate commercial practice and the maintenance of sound accounting and costing practices with regard to the ships' wastes disposal program.

II. OBJECTIVES

3. The purpose of the consultancy services is to:

(a) Design a tariff structure based on each function, activity or service such as reception, treatment, and disposal involved in the handling of the ships' wastes based on cost recovery for each type of waste and additionally design tariff levels/unit rates for each function, activity or service mentioned above. The tariff structure would be uniform for all the ports but the tariff levels/unit rates would vary from port to port;

(b) Develop operating accounts and accounts classifications (cost/service/revenue centers) at each port to record costs and revenues relating to each type of waste and the function, activity or service involved so that tariff levels/rates can be established with the full knowledge of the total costs for such function, activity or service;

(c) Publish a tariff manual and a cost accounting manual setting forth the applicable policies, procedures, classifications, definitions, and tariff categories and rates.

III. SCOPE OF WORK

General

4. The consultants shall carry out according to internationally accepted standards their assignment and their investigations, formulations of con-

cepts, conclusions, designs and recommendations, implementation of tariff and cost accounting systems, and the training of staff in order to achieve the objectives set forth in Section II above. The consultants shall cooperate fully with the Port Authorities and the Government agencies in the performance of their work, it being understood that the latter two will provide all relevant technical, financial, statistical and other data, studies and reports. The consultants shall review in detail the information, in particular any tariff, accounting and cost studies already carried out in connection with the ongoing projects financed by the World Bank Group at these ports, and make use of such studies. The consultants shall be solely responsible, however, for the analysis and interpretation of all information received, and for the findings, conclusions and recommendations made by them.

Work Program

5. The work program is to be carried out in three sequential stages:

Stage 1

6. The consultants shall:

(a) first familiarize themselves with the prevailing practices and policies at each port regarding tariff schedules and accounting systems;

(b) design and recommend a new sschedule of tariff structure and levels for the ships' wastes handling operations at each port. The tariff structure should consist of categories for each type of wastes such as oily wastes, chemicals, sewage, garbage, etc., under each function, activity or service, such as reception, treatment and disposal of these wastes and should be uniform for all the ports. The tariff levels/unit rates for each tariff category should take into account the full cost of the function, activity or service (arrived at through cost/service/revenue centers) including cost of capital and the financial objectives of each port. The tariff levels/rates would vary from port to port;

(c) design and recommend a double-entry activity and accrual based cost accounting system and accounts classifications to record the cost of the ships' wastes handling operations at each port on a uniform basis. The system should provide for functional accounts based on cost/service/revenue centers covering the full range of operations such as reception treatment and disposal for each type of waste, and character of expense types such as salaries and benefits, materials and supplies, purchased services, depreciation, interest, etc. The costing system should also develop and provide statistical information on operating plans and actuals, capacity utilization, etc. The objectives of the cost breakdown should be the availability of information for the control of costs through improvements in productivity, the provision of costs for each category or type of operation for determining total costs of an operation and for developing analytical details for determining productivity and performance levels. The recommended system should be capable of mechanization and full integration into the existing accounting systems and procedures.

(d) it would be entirely appropriate for the consultants to consider various alternatives of incentives built into the tariff schedule and recommend one which would encourage ships to use the wastes

handling facilities at each of the ports and thus would best serve the achievement of the project's objectives. Such alternatives may include: (i) in the early years of operation, say for a trial period of five years, the tariffs could be designed to cover just the variable costs and a portion of the fixed costs, thus providing a stimulant for the ships to get into the habit of using the new facilities; (ii) designing a system for the determination of quantities of wastes on the basis of what would be the total accumulation of various types of wastes in a ship from the time the ship left the previous port of call where facilities for ships' wastes handling are available to the time of its arrival at the Chinese port concerned, etc.

However, the enforcement of environmental safeguards (including the deterrents/penalties against the dumping of ships' wastes) under the national laws and/or international conventions to which China subscribe would come under the regulatory responsibilities of governmental and/or parastatal agencies. While such activities reinforce the objectives underlying the tariff policies, they do not play any direct role in the formulation or calculation of the tariff structure and levels. In this respect, the consultants should look into the adequacy of the deterrents and penalties as inducement towards achieving the objectives of the project. They should, for example, ascertain whether the deterrents and penalties are strong enough to prevent dumping of the wastes at sea, or whether the level of the deterrents and penalties are so low that ships may find it convenient to dump and to pay the penalties.

(e) prepare (i) a tariff manual setting forth the policies and procedures of tariff setting, a general tariff structure for all the ports and individual tariff rates for each port, and (ii) a cost accounting manual setting forth a coded chart of accounts and definitions, descriptions of cost classifications, methods and procedures.

Stage 2

7. The consultants shall help implement the above recommendations on tariff schedule and cost accounting system upon approval by GOC and the Port Authorities. The consultants shall also train the port staff in the concepts and operational techniques relevant to each system. Such training shall include on-the-job, classroom and other training. The consultants shall in addition recommend other methods of training including specialized training abroad and familiarization visits to ports where similar operations exist.

Stage 3

8. The consultants shall visit the ports on a follow-up basis within 12 months after the implementation of the work program under Stage 2 to ensure that the tariff schedule and cost accounting system are working satisfactorily; in particular that the staff are fully familiar with and capable of operating all aspects of the tariff and costing systems and that they clearly understand the relationships between the two systems.

IV. TIME SCHEDULE FOR CONSULTANTS' SERVICES AND REPORTS

9. The assignment would cover a total of about nine staff months as follows. Commencing on or about March 1, 1992, the consultants would provide inputs of: one month for the familiarization review, two months for designing and recommending the new tariff schedule and cost accounting system, five months for implementing the new systems and training ports staff; and, one month for a follow-up visit after the start of operations of the new facilities. The new system is expected to be fully operational by December 31, 1994.

10. The consultants shall commence work within 30 calendar days of the effective date of the services contract. The following reports should be prepared and submitted within the time limit indicated below:

(a) an Inception Report within three months (or as otherwise agreed) of the starting date describing the consultants' initial findings, outlining the methodology to be employed and listing preliminary proposals, plans and programs and bar charts showing breakdown of work by individuals responsible and by components and their time frame (number of copies of the report and their distribution to be defined);

(b) an Interim Report within six months of the starting date (or as otherwise agreed) summarizing all work performed, the consultants' findings and recommendations and bar charts showing progress of work and work completion schedule (number of copies of the report and their distribution to be defined);

(c) a Final Report within 12 months of the starting date or on completion of assignment (or as otherwise agreed) incorporating all revisions to and updating of the interim report and summary of additional work performed, the consultants' findings and recommendations and bar charts showing work performed by individual responsibilities and by components together with copies of the tariff and cost accounting manuals referred to in Section III, stage I (d) above (number of copies of the report and the manuals and their distribution to be defined).

V. ECONOMIC, FINANCIAL, TARIFFS, ACCOUNTING, PERSONNEL, STATISTICAL (INCLUDING SHIP MOVEMENTS), AND TECHNICAL DATA AVAILABLE

11. The individual Port Authorities are to provide consultants all existing data, studies and reports.

VI. COOPERATION OF GOVERNMENTAL AGENCIES AND COUNTERPARTS

12. In connection with work by the consultants that require the cooperation of other governmental agencies or authorities, the individual Port Authorities are to provide liaison and to ensure that the consultants have access to all information required for the completion of the work program.

13. The individual Port Authorities are to assign, on a full-time basis, appropriate counterparts to work with the consultants for the purposes of liaison, training, prompt review of the findings and recommendations of the consultants, and the implementation of approved recommendations.

VII. FACILITIES AND SUPPORTING STAFF OR THE CONSULTANTS

14. The individual Port Authorities are to provide the following facilities and staff to help the consultants in performing the services:

(a) office space and furniture;

(b) transportation within China, and

(c) utilities, telephone and telex services (to be determined).

15. The individual Port Authorities are to assist the consultants in locating satisfactory and appropriate hotel or other living accommodations in the vicinity of each port.

CHINA

SHIP WASTE DISPOSAL PROJECT

Oil Spill Contingency Planning and Response Study

Draft Scope of Work

1. The proposed technical assistance and institutional development component for oil spill contingency planning and response supports China's program under MARPOL. While China and its ports have recognized the potential problems of oil spills, they lack the expertise to develop complete contingency plans, adequately train staff and select appropriate equipment. All of the ports reviewed handle considerable quantities of petroleum hydrocarbons, as both crude oil and refined products, with projected increases in both the volume and size of the carriers being handled. Table 1 provides data for the six ports for the past three years. Of the six ports surveyed, only DPA deploys oil booms around the tankers during loading and off-loading.

2. Contingency plans developed for the Ports of Dalian and Shanghai are elementary in concept and place emphasis on response organization and equipment needs. Identification of ecologically-sensitive areas, potential problems for water users (e.g., cooling water intakes, fishing areas), available staff and disposal of collected materials) has not been considered. Further, such plans have been developed in each port and therefore lack a consistency which a "generic" model would provide; i.e., each port has had to develop its own plan. Accordingly, this project would provide technical assistance to MOC to develop a national center under the Harbor Superintendency Branch which presently has the institutional authority to assume command of spill response. It is proposed that this agency would also assume responsibility for providing general guidance on contingency planning, staff training in both contingency planning and spill response, and provide a central "clearing house" for news and information. As necessary, this agency could also coordinate equipment and manpower from several ports in the event of a major spill.

3. The second task within this project will be the provision of technical assistance to develop a "generic" contingency plan and to tailor this plan to the specific needs of the six ports. This will provide two benefits: (a) provision of a "generic" plan which the Harbor Superintendency can then adapt to specific needs in conjunction with concerned port; and (b) training of the central agency and port staff during the development of these plans.

4. The third element is the provision of staff training in spill response. Although China is anxious to have the capability to respond to spills and leakage, it was recognized that many of the ports lacked staff trained in spill response and the use of spill response equipment and chemicals. Training manuals and videos will be used and information packages will remain with the central agency for translation and distribution to the Port Authorities.

5. With the completion of training of staff, the final phase of the technical assistance will consist of identification of equipment appropriate to the needs of each port. Efforts will be made to ensure nationwide consistency in equipment selection so that in the event of a major spill, manpower and equipment can be transferred to the spill site, thereby providing a very large assemblage of equipment. Part of the equipment selection task will be the development of a schedule of training exercises, staff refresher courses, and staff upgrading courses.

6. The sub-project will be undertaken by consultants to be hired under the project for about 30 staff-months. An allocation of $450,000 is included in the project for this purpose.

CHINA

SHIP WASTE DISPOSAL PROJECT

Large Marine Ecosystem Study

Draft Scope of Work

1. LMEs, or Large Marine Ecosystems, are relatively large areas of the global exclusive economic zones, generally more than 200,000 km^2, characterized by unique bathymetry, hydrography, and productivity, within which marine populations have adapted to suitable reproductive, feeding and growth strategies. LMEs are thus naturally existing ecological units of ocean space.

2. On a global basis, nearly 95 percent of the biomass yields from the oceans are from the currently identified LMEs, currently some 50 in number. This demarcation provides a convenient and manageable mechanism for improved international cooperation in marine monitoring, modelling and management. Wile important work remains to be done in identifying the various forces which control biomass yields and fluctuations in individual LMEs, the expertise and technology needed to answer these questions is at hand. These are among areas that are becoming increasingly stressed from pollution, natural environment perturbation, and overexploitation of living resources.

3. The LME approach is being increasingly used by international agencies as a more manageable way of tackling ocean pollution problems, although this too has its drawbacks as some LMEs need the cooperative efforts of a very large number of countries; for example, the Caribbean Sea is shared by 38 countries. It is planned to initiate the application of this approach to the Yellow and China Seas under the proposed ship waste project.

Study Objectives

4. The objectives of the study would be to:

(a) assess the state of marine pollution;

(b) assess the impacts that coastal development activities, including the current ship waste disposal project, may have on the marine environment or on the protection and use of renewable marine resources on a sustainable basis; and

(c) develop a sound basis for continuous monitoring of the marine environment.

Scope of Work

5. Run the production-pollution-biodiversity monitoring module, which involves the use of continuous plankton recorders (CPR). CPR are towed behind ships-of-opportunity (commercial vessels) making quantitative collections of phytoplankton and zooplankton while also measuring up to 18 oceanographic

variables including: temperature; turbidity; chlorophyll a; bioluminescence; petrogenic hydrocarbons; salinity; upwelling and downwelling irradiance; dissolved oxygen; and nitrates and nitrites. This suite of measurements, along with the plankton collections, allows oceanographers to determine the general health and productivity of the ecosystem as well as providing indications of changes in biodiversity.

6. The monitoring program should include collection of comprehensive information on fish populations in the LME. This can be accomplished through the use of small, inexpensive chartered trawling vessels, hired locally, which collect samples of pelagic and demersal fishes. These fish are examined for gross pathology including tumors and lesions which have been shown in many other LMEs to be indicative of excessive marine pollution levels. In addition, fish age, growth and reproductive characteristics are determined. This provides information on general stock health and indicates whether fish resources in the LME are in a state of increase or decline. This type of information is particularly important in an LME such as the Yellow Sea where the human population depends very heavily upon local fish stocks as a source of healthful, inexpensive protein.

Schedules

7. Schedules of implementation should be prepared and adequate staffing provided for.

Cost Estimate

8. The cost estimate of the study should be detailed and explained to facilitate seeking assistance from international institutions.

CHINA

SHIP WASTE DISPOSAL PROJECT

Chemically Contaminated Water Treatment Study

Draft Scope of Work

1. Import and export of chemical cargoes, as both bulk and as containerized cargo, is becoming an increasingly important cargo type for the six ports reviewed. Many of the actual or proposed cargoes are of a petrochemical base, such as benzene, xylene, toluene or chemical feedstocks for plastics or industrial goods manufacturing (e.g., alkane alcohols, ethylene glycol). This cargo increase introduces the problem of treatment and discharge of ballast, bilge and tank wash waters and wash waters from containers that are contaminated due to the chemical cargoes. Under MARPOL Annex 2, ports are obliged to provide adequate reception and treatment facilities. While the Port Authorities readily recognized the need for facilities, they lack the expertise to identify, install and operate appropriate facilities. There was also the problem of the variable nature of the cargoes handled; e.g., the Port of Dalian imports 17-20 different major chemicals.

2. Of the six project ports, only the Port of Ningbo has developed extensive reception and treatment facilities for chemically-contaminated waters. The facilities, located in the Zhenhai Terminals, are capable of neutralizing acids and treating volatile chemicals, such as benzene and more complex chemicals, such as ethylene glycol. However, the facility is presently used mostly for importing of cargoes, thus generating little need for the facility. This has resulted in deterioration of the equipment and a need for refurbishing.

3. Only the Port of Shanghai has developed simple exchange systems to treat water used to clean containers used for shipment of chemical cargoes. These systems have a small treatment capacity and are used primarily to remove traces of chemicals.

4. The proposed project will include a study to assess and develop a treatment system for chemically-contaminated waters. The study will be divided into three phases:

(a) to assess the nature and quantities of chemical cargoes now or projected to be handled through the ports;

(b) to designate, jointly with staff from MOC and NEPA, effluent criteria for the chemical substances contaminating the ballast, bilge and wash waters;

(c) to design a treatment system that will be "generic" and modular in structure, so that it can be tailored to best handle the different types and quantities of chemicals handled in each port.

5. The project will require consultant expertise to undertake the three tasks for approximately 16 staff-months. An allocation of $250,000 is included for this purpose.

ATTACHMENT 7

CHINA

SHIP WASTE DISPOSAL PROJECT

Technical Assistance to Xiamen Port Authority

Draft Scope of Work

1. The Xiamen Port Authority does not have at present an Environmental Protection Bureau to undertake its portion of the project. However, XPA has developed the organizational outline for an Environmental Protection Bureau, but lacks the expertise and resources to recruit staff and implement an Environmental Monitoring Facility.

2. As part of the understandings on this project, XPA has agreed to establish and staff the proposed Environmental Protection Bureau. As part of this project, technical assistance will be given to XPA to assist in the completion of three tasks:

(a) identification of staffing requirements;

(b) staff training; and

(c) identification of facilities and equipment for the Environmental Monitoring and Laboratory facility.

3. The technical assistance will be provided by an expert/consultant hired for not more than two months to undertake the three tasks. A sum of $30,000 is included under the project for the purpose. Implementation of the recommended facilities is also provided for under the project.

CHINA

SHIP WASTE DISPOSAL PROJECT

Draft Terms of Reference for Establishing a Costing and Tariff System for Waste Reception and Disposal Services

I. INTRODUCTION

1. The Government of China (GOC) has decided to introduce a program of environmental measures in six ports, viz.: Tianjin, Huangpu, Dalian, Shanghai, Ningbo and Xiamen.

2. This will be achieved by providing operating facilities and systems in each port for the reception, treatment and disposal of ships' wastes in an environmentally sound manner in accordance with international conventions. An important requirement is that GOC and the Port Authorities operate the facilities in a financially viable manner, including the introduction of a tariff schedule based on full-cost recovery and appropriate commercial practice and the maintenance of sound accounting and costing practices with regard to the ships' wastes disposal program.

II. OBJECTIVES

3. The purpose of the consultancy services is to:

(a) Design a tariff structure based on each function, activity or service such as reception, treatment, and disposal involved in the handling of the ships' wastes based on cost recovery for each type of waste and additionally design tariff levels/unit rates for each function, activity or service mentioned above. The tariff structure would be uniform for all the ports but the tariff levels/unit rates would vary from port to port;

(b) Develop operating accounts and accounts classifications (cost/service/revenue centers) at each port to record costs and revenues relating to each type of waste and the function, activity or service involved so that tariff levels/rates can be established with the full knowledge of the total costs for such function, activity or service;

(c) Publish a tariff manual and a cost accounting manual setting forth the applicable policies, procedures, classifications, definitions, and tariff categories and rates.

III. SCOPE OF WORK

General

4. The consultants shall carry out according to internationally accepted standards their assignment and their investigations, formulations of concepts, conclusions, designs and recommendations, implementation of tariff and cost accounting systems, and the training of staff in order to achieve the objectives set forth in Section II above. The consultants shall cooperate fully with the Port Authorities and the Government agencies in the performance of their work, it being understood that the latter two will provide all relevant technical, financial, statistical and other data, studies and reports. The consultants shall review in detail the information, in particular any tariff, accounting and cost studies already carried out in connection with the ongoing projects financed by the World Bank Group at these ports, and make use of such studies. The consultants shall be solely responsible, however, for the analysis and interpretation of all information received, and for the findings, conclusions and recommendations made by them.

Work Program

5. The work program is to be carried out in three sequential stages:

Stage 1

6. The consultants shall:

(a) first familiarize themselves with the prevailing practices and policies at each port regarding tariff schedules and accounting systems;

(b) design and recommend a new schedule of tariff structure and levels for the ships' wastes handling operations at each port. The tariff structure should consist of categories for each type of wastes such as oily wastes, chemicals, sewage, garbage, etc., under each function, activity or service, such as reception, treatment and disposal of these wastes and should be uniform for all the ports. The tariff levels/unit rates for each tariff category should take into account the full cost of the function, activity or service (arrived at through cost/service/revenue centers) including cost of capital and the financial objectives of each port. The tariff levels/rates would vary from port to port;

(c) design and recommend a double-entry activity and accrual based cost accounting system and accounts classifications to record the cost of the ships' wastes handling operations at each port on a uniform basis. The system should provide for functional accounts based on cost/service/revenue centers covering the full range of operations such as reception treatment and disposal for each type of waste, and character of expense types such as salaries and benefits, materials and supplies, purchased services, depreciation, interest,

etc. The costing system should also develop and provide statistical information on operating plans and actuals, capacity utilization, etc. The objectives of the cost breakdown should be the availability of information for the control of costs through improvements in productivity, the provision of costs for each category or type of operation for determining total costs of an operation and for developing analytical details for determining productivity and performance levels. The recommended system should be capable of mechanization and full integration into the existing accounting systems and procedures.

(d) it would be entirely appropriate for the consultants to consider various alternatives of incentives built into the tariff schedule and recommend one which would encourage ships to use the wastes handling facilities at each of the ports and thus would best serve the achievement of the project's objectives. Such alternatives may include: (i) in the early years of operation, say for a trial period of five years, the tariffs could be designed to cover just the variable costs and a portion of the fixed costs, thus providing a stimulant for the ships to get into the habit of using the new facilities; (ii) designing a system for the determination of quantities of wastes on the basis of what would be the total accumulation of various types of wastes in a ship from the time the ship left the previous port of call where facilities for ships' wastes handling are available to the time of its arrival at the Chinese port concerned, etc.

However, the enforcement of environmental safeguards (including the deterrents/penalties against the dumping of ships' wastes) under the national laws and/or international conventions to which China subscribe would come under the regulatory responsibilities of governmental and/or parastatal agencies. While such activities reinforce the objectives underlying the tariff policies, they do not play any direct role in the formulation or calculation of the tariff structure and levels. In this respect, the consultants should look into the adequacy of the deterrents and penalties as inducement towards achieving the objectives of the project. They should, for example, ascertain whether the deterrents and penalties are strong enough to prevent dumping of the wastes at sea, or whether the level of the deterrents and penalties are so low that ships may find it convenient to dump and to pay the penalties.

(e) prepare (i) a tariff manual setting forth the policies and procedures of tariff setting, a general tariff structure for all the ports and individual tariff rates for each port, and (ii) a cost accounting manual setting forth a coded chart of accounts and definitions, descriptions of cost classifications, methods and procedures.

Stage 2

7. The consultants shall help implement the above recommendations on tariff schedule and cost accounting system upon approval by GOC and the Port Authorities. The consultants shall also train the port staff in the concepts and operational techniques relevant to each system. Such training shall include on-the-job, classroom and other training. The consultants shall in addition recommend other methods of training including specialized training abroad and familiarization visits to ports where similar operations exist.

Stage 3

8. The consultants shall visit the ports on a follow-up basis within 12 months after the implementation of the work program under Stage 2 to ensure that the tariff schedule and cost accounting system are working satisfactorily; in particular that the staff are fully familiar with and capable of operating all aspects of the tariff and costing systems and that they clearly understand the relationships between the two systems.

IV. TIME SCHEDULE FOR CONSULTANTS' SERVICES AND REPORTS

9. The assignment would cover a total of about nine staff months as follows. Commencing on or about March 1, 1992, the consultants would provide inputs of: one month for the familiarization review, two months for designing and recommending the new tariff schedule and cost accounting system, five months for implementing the new systems and training ports staff; and, one month for a follow-up visit after the start of operations of the new facilities. The new system is expected to be fully operational by December 31, 1994.

10. The consultants shall commence work within 30 calendar days of the effective date of the services contract. The following reports should be prepared and submitted within the time limit indicated below:

(a) an Inception Report within three months (or as otherwise agreed) of the starting date describing the consultants' initial findings, outlining the methodology to be employed and listing preliminary proposals, plans and programs and bar charts showing breakdown of work by individuals responsible and by components and their time frame (number of copies of the report and their distribution to be defined);

(b) an Interim Report within six months of the starting date (or as otherwise agreed) summarizing all work performed, the consultants' findings and recommendations and bar charts showing progress of work and work completion schedule (number of copies of the report and their distribution to be defined);

(c) a Final Report within 12 months of the starting date or on completion of assignment (or as otherwise agreed) incorporating all revisions to and updating of the interim report and summary of

additional work performed, the consultants' findings and recommendations and bar charts showing work performed by individual responsibilities and by components together with copies of the tariff and cost accounting manuals referred to in Section III, stage I (d) above (number of copies of the report and the manuals and their distribution to be defined).

V. ECONOMIC, FINANCIAL, TARIFFS, ACCOUNTING, PERSONNEL, STATISTICAL (INCLUDING SHIP MOVEMENTS), AND TECHNICAL DATA AVAILABLE

11. The individual Port Authorities are to provide consultants all existing data, studies and reports.

VI. COOPERATION OF GOVERNMENTAL AGENCIES AND COUNTERPARTS

12. In connection with work by the consultants that require the cooperation of other governmental agencies or authorities, the individual Port Authorities are to provide liaison and to ensure that the consultants have access to all information required for the completion of the work program.

13. The individual Port Authorities are to assign, on a full-time basis, appropriate counterparts to work with the consultants for the purposes of liaison, training, prompt review of the findings and recommendations of the consultants, and the implementation of approved recommendations.

VII. FACILITIES AND SUPPORTING STAFF OR THE CONSULTANTS

14. The individual Port Authorities are to provide the following facilities and staff to help the consultants in performing the services:

(a) office space and furniture;

(b) transportation within China, and

(c) utilities, telephone and telex services (to be determined).

15. The individual Port Authorities are to assist the consultants in locating satisfactory and appropriate hotel or other living accommodations in the vicinity of each port.

Table 1

CHINA

SHIP WASTE DISPOSAL PROJECT

Chinese Environmental Quality Standard for Surface Water

Basic Requirements:

All water bodies must not contain the following matter from non-natural sources:

a. All precipitable matters which can result in obnoxious precipitations.
b. Floating matter, such as debris, floating residues, oil or other unsightly matters.
c. Produce obnoxious color, odor, taste or turbidity.
d. Harmful, poisonous or has adverse biological reaction to human, animal and vegetation.
e. Can cause growth of unpleasant aquatic bio-matters.

No.	Constituent	Class I	Class II	Class III	Class IV	Class V
1.	Water temperature degrees C	Ambient water temperature changes from man-made causes should be limited to: Average maximum temperature rise in summer period < 1 Average maximum temperature drop in winter period < 2				
2.	pH	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6 - 9
3.	Sulphate (SO4) <	250	250	250	250	250
4.	Chlorides (Cl) <	250	250	250	250	250
5.	Soluble iron <	0.3	0.3	0.5	0.5	1.0
6.	Total manganese <	0.1	0.1	0.1	0.5	1.0
7.	Total copper <	0.01	1.0 (fish 0.01)	1.0 (fish 0.01)	1.0	1.0
8.	total zinc <	0.05	1.0 (fish 0.1)	1.0 (fish 0.1)	2.0	2.0
9.	Nitrate (as N) <	10	10	20	20	25
10.	Nitrite (as N) <	0.06	0.1	0.15	1.0	1.0
11.	Free ammonia <	0.02	0.02	0.02	0.02	0.02
12.	Kjeldahl	0.5	0.5	1.0	2.0	2.0
13.	Total phosphorus (as P) <	0.02	0.1 (lake, res. 0.025)	0.1 (lake, res. 0.05)	0.2	0.2
14.	Permanganate index <	2	4	6	8	10
15.	Dissolved oxygen >	90% sat	6	5	3	2
16.	COD <	15	15	15	20	25
17.	BOD5 <	3	3	4	6	10
18.	Fluoride (as F) <	1.0	1.0	1.0	1.5	1.5
19.	Selenium (quad) <	0.01	0.01	0.01	0.02	0.02
20.	Total arsenic <	0.05	0.05	0.05	0.1	0.1
21.	Total mercury <	0.00005	0.00005	0.0001	0.0001	0.0001
22.	Total cadmium <	0.001	0.005	0.005	0.005	0.01
23.	Chromium (hex) <	0.01	0.05	0.05	0.05	0.1
24.	Total lead <	0.01	0.05	0.05	0.05	0.1
25.	Total cyanide <	0.005	0.05 (fish 0.005)	0.2 (fish 0.005)	0.2	0.2
26.	Volatile phenol <	0.002	0.002	0.005	0.01	0.01
27.	Petroleum <	0.05	0.05	0.05	0.5	1.0
28.	Anionic Surfactant <	0.2	0.2	0.2	0.3	0.3
29.	Total coliform (No/L) <			10000		
30.	Benzene (ug/L) <	0.0025	0.0025	0.0025		

Class Description

I Mainly used for water source, national natural protection areas.
II Mainly suitable as source in first class protection area for community drinking water supply, precious fish protected area, spawning ground for fish and shrimps.
III Mainly suitable as source in second class protection area for community drinking water supply, fishery protection area and public swimming area.
IV Mainly suitable for typical industrial water supply, and recreation where there is no human bodily contact with the water.
V Mainly suitable for agricultural water supply, and typical water areas for tourism.

Note: Where a water regime is suitable for a number of potential uses, classification will be according to its highest uses. Where there is class difference between seasons, seasonal classification can be used.

TABLE 2

CHINA

SHIP WASTE DISPOSAL PROJECT

Chinese Standards Compared to Foreign Standards

(A) Industrial wastewater discharge standards (mg/L)

Parameter	China	Shanghai	Canada*
mercury	0.05	0.02	0.1
cadmium	0.1	0.1	1.0
chromium	0.5 (Cr^{+6})	0.5 (Cr^{+6})	5.0 (total)
arsenic	0.5	0.5	1.0
lead	1.0	1.0	2.0
pH	6-9	6-9	5.5-9.5
floatables	500	500	-
copper	1.0	1.0	2.0
zinc	5.0	5.0	4.0
BOD5	60	30	30
COD	100	50	-
phenol	0.5	1.0	1.0
sulphides	1.0	1.0	1.0
cyanide	0.5	1.0	2.0
total phosphorus	0.5	1.0	-
oil	10	10	15
fluoride	10	10	-
nitrobenzene	5.0	5.0	-
benzene	3.0	3.0	-

* effluent from oily waters treatment centre

(B) Air emission standards (mg/m3)

Parameter	China (1982)				U.S. (1982)	Canada (1982)
	Grade I	Grade II	Grade III	Grade IV		
total settleable particulate		0.30			0.075 (AGM)*	0.080(AGM)
sulphur dioxide		0.15			0.080 (AAM)*	0.055(AAM)
nitrogen oxides		0.10			0.100(AAM)	0.200(24hr)
hydrocarbons					0.160	-
oxidants (as O3)					0.160(1hr)	0.165(1hr)
fluorides					-	0.138(24hr)

Notes: Chinese standards are based on daily averages
(Quality Criterion of Atmospheric Environment, GB3095-82)

* AAM = annual arithmetic mean
AGM = annual geometric mean

Table 3
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CHINA

SHIP WASTE DISPOSAL PROJECT

Estimated Project Cost /a
($ million)

	Project Cost			of which	
	Local	Foreign	Total	IDA	GEF
National Component					
Environmental monitoring & tracking	0.65	1.35	2.20	0.54	1.09
Oil spill contingency planning study	-	0.45	0.45	-	0.42
Chemically contaminated water treatment study	-	0.25	0.25	-	0.23
Subtotal	0.65	2.05	2.70	0.54	1.74
Ports' Component					
Disposal facilities:					
Dalian	1.15	2.05	3.20	0.78	1.60
Tianjin	7.00	2.00	9.00	2.05	3.92
Shanghai	16.30	8.50	24.80	5.20	10.08
Ningbo	4.80	1.70	6.50	1.83	3.55
Guangzhou	5.36	3.20	8.56	2.08	4.17
Xiamen	3.52	1.61	5.13	1.37	2.68
Technical assistance to Xiamen Port Authority	-	0.03	0.03	-	0.03
Subtotal	38.13	19.09	57.22	13.31	26.03
Base cost	38.78	21.14	59.92	13.85	27.77
Physical contingencies	1.48	0.86	2.34	0.55	1.07
Price contingencies	1.54	1.00	2.54	0.60	1.16
Total cost	41.80	23.00	64.80	15.00	30.00

/a In January 1992 prices. The project is exempt from taxes and duties.

CHINA

SHIP WASTE DISPOSAL PROJECT

Detailed Cost Estimates for the Port of Dalian

Item	Total	Domestic civil works	Domestic equip.	Foreign equip.
			$ million	
Build two 5,000 ton oily water receiving/holding tanks and chemically contaminated water treatment facilities; new sludge handling facility; refurbish existing oily water settling basins	0.650	0.380	0.150	0.120
Replace oily water receiving/ holding tanks at Crude Oil Terminal (1-4,000 ton)	0.300	0.200	0.100	-
Replacement of oily water equipment	0.650	-	-	0.650
New sludge handling facility (Crude Oil Terminal)	0.700	-	-	0.700
Purchase oil containment boom	0.530	-	0.300	0.230
Connections and piping for sanitary sewage	0.040	0.020	-	0.020
Laboratory	0.330	-	-	0.330
Base cost	3.200	0.600	0.550	2.050
Contingencies	0.300			
Total cost	3.500			

Table 3
Page 3 of 7

CHINA

SHIP WASTE DISPOSAL PROJECT

Detailed Cost Estimates for the Port of Tianjin

Item	Total	Domestic civil works	Domestic equip.	Foreign equip.
			$ million	
Purchase new oily waters treatment barge (500 tons cap.)	2.000	-	2.000	-
Refurbish existing m oil waters treatment barge (30 t/hr)	0.480	-	1.480	-
Purchase oil containment boom	0.500	-	0.500	-
Expand East Terminal sewage treatment plant	3.900	2.000	0.690	1.210
Purchase new garbage barge	1.100	-	1.100	-
Purchase 2 new garbage trucks	0.350	-	-	0.350
Laboratory equipment	0.670	0.230	-	0.440
Base cost	9.000	2.230	4.770	2.000
Contingencies	0.700			
Total cost	9.700			

CHINA

SHIP WASTE DISPOSAL PROJECT

Detailed Cost Estimates for the Port of Shanghai

Item	Total	Domestic civil works	Domestic equip.	Foreign equip.
			$ million	
New land-based oily and chemically contaminated water treatment facility (300,000 tons/yr.)	16.900	9.400	3.000	4.500
Purchase oil containment boom	0.450	-	-	0.450
Garbage treatment facilities	6.690	1.800	2.100	2.790
Laboratory equipment	0.760	-	-	0.760
Base cost	24.800	11.200	5.100	8.500
Contingencies	2.000			
Total cost	26.800			

Table 3
Page 5 of 7

CHINA

SHIP WASTE DISPOSAL PROJECT

Detailed Cost Estimates for the Port of Ningbo

Item	Total	Domestic civil works	Domestic equip.	Foreign equip.
			$ million	
Build new land-based treatment facility at Beilun	1.600	0.600	0.360	0.640
Refurbish existing oily waters treatment barge (60 t/hr)	0.100	-	0.100	-
Purchase new oily waters treatment barge (300 t/hr)	2.300	-	2.300	-
Purchase oil containment boom	0.430	-	0.430	-
Beilun Iron Ore waste water and sewage treatment facility	0.430	0.110	0.320	-
Connections and piping for sewage at Zhenhai	0.120	0.010	0.110	-
Purchase garbage barges	0.400	-	0.400	-
Purchase new garbage trucks and build new incinerator	0.630	0.060	-	0.570
Laboratory equipment	0.490	-	-	0.490
Base cost	6.500	0.780	4.020	1.700
Contingencies	0.520			
Total cost	7.020			

Table 3
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CHINA

SHIP WASTE DISPOSAL PROJECT

Detailed Cost Estimates for the Port of Guangzhou

Item	Total	Domestic civil works	Domestic equip.	Foreign equip.
			$ million	
Purchase oil containment boom	1.330	-	1.000	0.330
Purchase new sewage collection barge	0.750	-	0.750	-
Build secondary sewage, oil and chemically contaminated water treatment facilities	5.590	2.540	0.820	2.230
Build new garbage incinerator	0.350	0.200	0.050	0.100
Laboratory equipment	0.540	-	-	0540
Base cost	8.560	2.740	2.620	3.200
Contingencies	0.720			
Total cost	9.280			

Table 3
Page 7 of 7

CHINA

SHIP WASTE DISPOSAL PROJECT

Detailed Cost Estimates for the Port of Xiamen

Item	Total	Domestic civil works	Domestic equip.	Foreign equip.
			$ million	
Purchase new oily waters treatment barge	2.000	0.200	1.800	-
Purchase oil containment boom	0.260	-	-	0.260
Build secondary sewage treatment plant	1.250	0.420	0.380	0.450
Purchase new garbage barge	0.190	-	0.190	-
Build new garbage incinerator	0.500	0.200	-	0.300
Environmental monitoring station	0.930	0.330	-	0.600
Base cost	5.130	1.150	2.370	1.610
Contingencies	0.350			
Total cost	5.480			

Table 4

CHINA

SHIP WASTE DISPOSAL PROJECT

Estimated Ship Waste Quantities for 1990

Port	Ship Type	Number Of Ships	Oily Waste		Sewage		Garbage		Total	
			Tons	M^3	Tons	M^3	Tons	M^3	Tons	M^3
Dalian	O.G.	4,400	22,200	23,368	69,930	63,573	2,797	18,648	94,927	105,589
	Coastal	6,460	32,300	34,000	72,675	66,068	2,907	19,380	107,882	119,448
	Total	10,900	54,500	57,368	142,605	129,641	5,704	38,028	202,809	225,037
Tianjin	O.G.	2,380	11,900	12,526	37,485	34,077	1,499	9,996	50,884	56,600
	Coastal	3,210	15,600	16,421	35,100	319,909	1,404	9,360	52,104	57,690
	Total	5,500	27,500	28,947	72,585	65,986	2,903	19,356	102,988	114,290
Shanghai	O.G.	5,700	28,500	30,000	89,775	81,614	3,591	23,940	121,866	135,554
	Coastal	19,700	98,500	103,684	221,625	201,477	8,865	59,100	328,990	364,261
	Total	25,400	127,000	133,684	311,400	283,091	12,456	83,040	450,856	499,815
Ningbo	O.G.	465	2,325	2,447	7,324	6,658	293	1,953	9,942	11,058
	Coastal	935	4,675	4,921	10,519	9,563	421	2,805	15,615	17,289
	Total	1,40	7,000	7,368	17,843	16,220	714	4,758	25,556	28,347
Xiamen	O.G.	1,345	6,725	7,079	21,184	19,258	847	5,649	28,756	31,986
	Coastal	7,055	35,275	37,132	79,369	72,153	3,175	21,165	117,819	130,450
	Total	8,400	42,000	44,211	100,553	91,411	4,022	26,814	146,575	162,436
Guangzhou	O.G.	2,200	11,000	11,579	34,650	31,500	1,386	9,240	47,036	52,319
	Coastal	8,500	42,500	44,737	95,625	86,932	3,825	25,500	141,950	157,169
	Total	10,700	53,500	56,316	130,275	118,432	5,211	34,740	188,986	209,488
Total		62,300	311,500	327,895	775,260	704,782	31,010	206,736	1,117,770	1,239,413

Note 1: Numbers of ships were estimated by dividing the total throughput by the average ship size.

Note 2: Oily waste weight: 950 kg/M^3.

Note 3: Sewage: 50 liters/day/person. Crew: 35 ocean going, 25 coastal. Average collection period: 9 days. Unit weight: 1.1 tons/M^3.

Note 4: Garbage: 2 kg/person/day. Ship time in port as for Note 2 above. Unit weight of garbage: 150 kg/M^3.

Nomenclature: O.G. = ocean going; Coastal = domestic shipping.

CHINA

SHIP WASTE DISPOSAL PROJECT

Dalian Port

Income and Funds Flow Statement - Without Project
Y million

For year ending December 31,	Updated		Forecast				
	1989	1990	1991	1992	1993	1994	1995
Operating Revenues	408.4	512.0	547.4	588.2	629.4	673.5	720.6
Operating Expenses	178.1	234.5	260.7	287.0	315.7	347.3	382.0
Net Operating Income	230.3	277.5	286.7	301.2	313.7	326.2	338.6
Interest Expense	2.1	21.4	20.0	20.0	20.0	20.0	20.0
Non-Operating items--Net Dr/(Cr)	20.8	35.5	20.0	20.0	20.0	20.0	20.0
Net Income Before taxes	207.4	220.6	246.7	261.2	273.7	286.2	298.6
Taxes and payments to state	79.7	83.1	80.0	80.0	80.0	80.0	80.0
Net Income after Taxes	127.7	137.5	166.7	181.2	193.7	206.2	218.6
Add. Depreciation	30.0	35.8	38.0	38.0	38.0	38.0	38.0
Internal generation of funds	157.7	173.3	204.7	219.2	155.7	168.2	256.6
State contribution	-	85.8	-	-	-	-	-
Borrowings	58.7	146.0	100.0	100.0	-	-	-
Sources of Funds	216.4	405.1	304.7	319.2	155.7	168.2	256.6
Application of Funds	200.0	400.0	300.0	310.0	140.0	145.0	225.0
Net Funds Flow	16.4	5.1	4.7	9.2	15.7	23.2	31.6
Add: Opening Cash Position	69.1	85.5	90.6	95.3	114.5	140.2	178.4
Cash Position Year End	85.5	90.6	95.3	114.5	140.2	178.4	235.0

Table 5
Page 2 of 2

Dalian Port - Project Facilities - Financing Plan (1992-1995)
and Funds Flow - With Project
Y million

	Forecast				
	Total	1992	1993	1994	1995[1]
Project Facilities					
Financing Plan					
Capital Investment	20.0	1.3	6.7	9.4	2.6
Less: External financing	14.0	0.9	4.7	6.6	1.8
Port's contribution	6.0	0.4	2.0	2.8	0.8
Funds Flow					
Operating and maintenance expense					2.0
Depreciation					2.0
					4.0
Operating revenues[2]					4.0
Project-facilities internal cash generation	2.0	-	-	-	2.0
Less: Contribution towards project financing	6.0	0.4	2.0	2.8	0.8
Interest expense[3]	0.2	-	-	-	0.2
	6.2	0.4	2.0	2.8	1.0
Project-related surplus/(deficit)	(4.2)	(0.4)	(2.0)	(2.8)	1.0
Net funds flow from regular port operations	79.7	9.2	15.7	23.2	31.6
Consolidated surplus/(deficit)	75.5	8.8	13.7	20.4	32.6

1/The project facilities become operational beginning 1995.

2/Notional amount equivalent to total operating expenses which will be targeted for collection through cost-recovery-based tariff structure and levels.

3/Annual interest on relent IDA Credit during construction is not significant enough in amount to be included. Grace period will end in 1996.

Tianjin Port - Project Facilities - Financing Plan (1992-1995)
and Funds Flow - With Project
Y million

	Total	Forecast 1992	1993	1994	1995 1/
Project Facilities					
Financing Plan					
Capital Investment	50.9	3.4	16.8	23.9	6.8
Less: External financing	35.7	2.4	11.7	16.8	4.8
Port's contribution	15.2	1.0	5.1	7.1	2.0
Funds Flow					
Operating and maintenance expense					5.1
Depreciation					5.1
Operating revenues 2/					10.2
					10.2
Project-related internal cash generation	5.1	-	-	-	5.1
Less: Contribution towards project financing	15.2	1.0	5.1	7.1	2.0
Interest expense 3/	0.6	-	-	-	0.6
	(15.8)	(1.0)	(5.1)	(7.1)	2.6
Project-related Surplus/(deficit)	(10.7)	(1.0)	(5.1)	(7.1)	2.5
Net funds flow from regular port operations	109.1	17.5	19.5	27.1	45.0
Consolidated surplus/deficit	98.4	16.5	14.4	20.0	47.5

1/The project facilities become operational beginning 1995.

2/Notional amount equivalent to total operating expenses which will be targeted for collection through cost-recovery-based tariff structure and levels.

3/Annual interest on relent IDA Credit during construction is not significant enough in amount to be included. Grace period will end in 1996.

CHINA

SHIP WASTE DISPOSAL PROJECT

Tianjin Port
Income and Funds Flow Statement - Without Project
Y million

As at December 31,	Updated 1989	Updated 1990	Forecast 1991	Forecast 1992	Forecast 1993	Forecast 1994	Forecast 1995
Operating Revenues	404.7	378.3	396.1	414.0	432.6	452.1	472.5
Operating Expenses	191.8	200.8	213.1	226.8	238.1	250.0	262.5
Net Operating Income	212.9	177.5	183.0	187.2	194.5	202.1	210.0
Interest Expense	2.8	7.7	40.0	40.0	40.0	40.0	40.0
Nonoperating items--Net Dr/Cr)	8.9	8.6	5.0	5.0	5.0	5.0	5.0
Net income before taxes	201.2	161.2	138.0	142.0	149.5	157.1	175.0
Taxes and payments to state	14.2	13.3	20.0	20.0	20.0	20.0	20.0
Net income after taxes	187.0	147.9	118.0	122.0	129.5	137.1	155.0
Add. depreciation	30.3	35.5	35.5	35.5	40.0	40.0	40.0
Internatal generation of funds	217.3	183.4	153.5	157.5	169.5	177.1	195.0
State contribution	78.6	268.6	-	-	-	-	-
Borrowings	112.3	223.4	160.0	160.0	-	-	-
Sources of funds	408.2	675.4	313.5	317.5	169.5	177.1	195.0
Applications of funds	416.7	666.7	300.0	300.0	150.0	150.0	150.0
Net funds flow	(8.5)	8.7	13.5	17.5	19.5	27.1	45.0
Add: Opening Cash Position	103.0	94.5	103.2	116.7	133.2	152.7	179.8
Cash Position Year End	94.5	103.2	116.7	133.2	152.7	179.8	224.8

Table 7

Page 1 of 2

CHINA

SHIP WASTE DISPOSAL PROJECT

Shanghai Port

Income and Funds Flow Statement - Without Project

Y million

For year ending December 31,	Updated		Forecast				
	1989	1990	1991	1992	1993	1994	1995
Operating Revenues	903.9	1,003.5	1,070.7	1,142.1	1,218.3	1,300.0	1,386.7
Operating Expenses	517.7	594.4	638.7	685.5	734.4	785.8	840.8
Net Operating Income	386.2	409.1	432.0	456.6	483.9	514.2	545.9
Interest Expense	-	-	8.0	9.0	10.0	13.0	16.0
Non-Operating items--Net Dr/(Cr)	59.2	65.2	70.0	70.0	70.0	70.0	70.0
Net Income Before Taxes	327.0	343.9	354.0	377.6	403.9	431.2	459.9
Taxes and payments to state	104.0	110.0	112.0	115.0	120.0	129.0	136.0
Net Income after Taxes	223.0	233.9	242.0	262.6	283.9	302.2	323.9
Add. Depreciation	31.8	50.7	58.0	60.0	60.0	60.0	60.0
Internal generation of funds	254.8	284.6	300.0	322.6	343.9	362.2	383.9
State contribution	-	-	-	-	-	-	-
Borrowings	96.6	324.0	-	-	-	-	-
Sources of Funds	351.4	608.0	300.0	322.6	343.9	362.2	383.9
Applications of Funds	358.0	600.0	250.0	260.0	270.0	280.0	300.0
Net Funds Flow	(6.6)	18.6	50.0	62.6	73.9	82.2	83.9
Add: Opening Cash Position	150.4	143.8	152.4	202.4	265.0	338.9	421.1
Cash Position Year End	143.8	152.4	202.4	265.0	338.9	421.1	505.0

Shanghai Port - Project Facilities - Financing Plan (1992-1995)
and Funds Flow - With Project
Y million

	Forecast				
	Total	1992	1993	1994	1995[1]
Project Facilities					
Financing Plan					
Capital Investment	131.6	8.9	43.6	61.5	17.6
Less: External financing	92.4	6.3	30.6	43.2	12.3
Port's contribution	39.2	2.6	13.0	18.3	5.3
Funds Flow					
Operating and maintenance expense					13.2
Depreciation					13.2
					26.4
Operating revenues[2]					26.4
Project-facilities internal cash generation	13.2	-	-	-	13.2
Less: Contribution towards project financing	39.2	2.6	13.0	18.3	5.3
Interest expense[3]	2.9	2.6	0.4	1.0	1.5
	42.1	5.2	13.4	19.3	6.8
Project-related surplus/(deficit)	(28.9)	(5.2)	(13.4)	(19.3)	6.4
Net funds flow from regular port operation	302.6	62.6	73.9	82.2	83.9
Consolidated Surplus/(deficit)	273.7	57.4	60.5	62.9	90.3

1/The project facilities become operational beginning 1995.

2/Notional amount equivalent to total operating expenses which will be targeted for collection through cost-recovery-based tariff structure and levels.

3/Annual interest on relent IDA Credit during construction is not significant enough in amount to be inlcuded. Grace period will end in 1996.

CHINA

SHIP WASTE DISPOSAL PROJECT

Ningbo Port

Income and Funds Flow Statement - Without Project
Y million

For year-ending December 31	Updated		Forecast				
	1989	1990	1991	1992	1993	1994	1995
Operating Revenues	111.5	149.1	169.4	191.7	216.3	243.3	274.9
Operating Expenses	74.3	102.2	114.8	127.5	140.3	154.5	170.0
Net Operating Income	37.2	46.9	54.6	64.2	76.0	88.8	104.9
Interest Expense	-	-	5.0	6.0	7.0	7.0	6.0
Non-Operating items--Net Dr/(Cr)	3.8	7.9	8.0	8.0	8.0	8.0	8.0
Net Income Before Taxes	33.4	39.0	41.6	50.2	61.0	73.8	90.9
Taxes and payments to state	10.5	11.9	13.6	16.0	19.0	22.0	26.0
Net Income after Taxes	22.9	27.1	28.0	34.2	42.0	51.8	64.9
Add. Depreciation	17.0	24.4	25.0	25.0	30.0	30.0	30.0
Internal generation of funds	39.9	51.5	53.0	59.2	72.0	81.8	94.9
State contribution	46.5	87.8	37.0	15.0	-	-	-
Borrowings	74.8	86.7	26.0	33.0	-	-	-
Sources of Funds	161.2	225.5	116.0	107.2	72.0	81.8	94.9
Applications of Funds	137.1	286.4	110.0	100.0	50.0	50.0	55.0
Net Funds Flow	24.1	(60.9)	6.0	7.2	22.0	31.8	39.9
Add: Opening Cash Position	111.7	135.8	74.9	80.9	87.9	109.9	140.7
Cash Position Year End	135.8	74.9	80.9	87.9	109.9	140.7	180.6

Ningbo Port - Project Facilities - Financing Plan (1992-1995)
and Funds Flow - With Project
Y million

	Forecast				
	Total	1992	1993	1994	1995[1]/
Project Facilities					
Financing Plan					
Capital Investment	44.4	2.9	14.6	20.9	6.0
Less: External financing	31.2	2.1	10.2	14.7	4.2
Port's contribution	13.2	0.8	4.4	6.2	1.8
Funds Flow					
Operating and maintenance expense					4.4
Depreciation					4.4
					8.8
Operating revenues[2]/					8.8
Project facilities-internal cash generation	4.4	-	-	-	4.4
Less: Contribution towards project financing	13.2	0.8	4.4	6.2	1.8
Interest expense[3]/	0.5	-	-	-	0.5
	13.7	0.8	4.4	6.2	2.3
Project-related surplus/(deficit)	(9.3)	(0.8)	(4.4)	(6.2)	2.1
Net funds flow from regular port operation	100.9	7.2	22.0	31.8	39.9
Consolidated Surplus/(deficit)	91.6	6.4	17.6	25.6	42.0

1/The project facilities become operational beginning 1995.

2/Notional amount equivalent to total operating expenses which will be targeted for collection through cost-recovery-based tariff structure and levels.

3/Annual interest on relent IDA Credit during construction is not significant enough in amount to be included. Grace period will end in 1996.

CHINA

SHIP WASTE DISPOSAL PROJECT

Guangzhou Port

Income and Funds Flow Statement - Without Project
Y million

For year ending December 31,	Updated		Forecast				
	1989	1990	1991	1992	1993	1994	1995
Operating Revenues	365.3	340.9	380.6	425.7	478.6	536.0	600.3
Operating Expenses	193.1	193.1	218.1	248.2	286.5	329.5	378.9
Net Operating Income	172.2	147.8	162.5	177.5	192.1	206.5	221.4
Interest Expense	-	-	10.7	16.0	20.0	20.0	20.0
Non-Operating items--Net Dr/(Cr)	21.4	27.0	12.3	20.0	35.0	35.0	35.0
Net Income Before Taxes	150.8	120.8	139.5	141.5	137.1	151.5	166.4
Taxes and payments to state	13.2	12.0	24.0	27.0	60.0	60.0	60.0
Net Income after Taxes	137.6	108.8	115.1	114.5	77.1	91.5	106.4
Add. Depreciation	27.3	28.2	30.0	30.0	30.0	30.0	30.0
Internatal generation of funds	164.9	137.0	145.1	144.5	107.1	121.5	136.4
State contribution	-	-	-	-	-	-	-
Borrowings	41.1	95.9	150.0	105.0	-	-	-
Sources of Funds	206.0	232.9	295.1	249.5	107.1	121.5	136.4
Applications of funds	190.0	235.7	289.5	230.0	100.0	100.0	100.0
Net Funds Flow	16.0	(2.8)	5.6	16.5	7.1	21.5	36.4
Add: Opening Cash Position	56.0	72.0	69.2	69.2	85.7	92.8	114.3
Cash Position Year End	72.0	69.2	74.8	85.7	92.8	114.3	140.7

Guangzhou Port - Project Facilities - Financing Plan (1992-1995)
and Funds Flow - With Project
Y million

	Forecast				
	Total	1992	1993	1994	1995[1]
Project Facilities					
Financing Plan					
Capital Investment	53.6	3.6	17.9	24.9	7.2
Less: External financing	37.6	2.5	12.6	17.4	5.1
Port's contribution	16.0	1.1	5.3	7.5	2.1
Funds Flow					
Operating and maintenance expense					5.4
Depreciation					5.4
					10.8
Operating revenues[2]					10.8
Project facilities-internal cash generation	5.4	-	-	-	5.4
Less: Contribution towards project financing	16.0	1.1	5.3	7.5	2.1
Interest expense[3]	0.6	-	-	-	0.6
	16.6	1.1	5.3	7.5	2.7
Project-related surplus/(deficit)	(11.2)	(1.1)	(5.3)	(7.5)	2.7
Net funds flow from regular port operations	81.5	16.5	7.1	21.5	36.4
Consolidated surplus/(deficit)	70.3	15.4	1.8	14.0	39.1

1/The project facilities become operational beginning 1995.

2/Notional amount equivalent to total operating expenses which will be targeted for collection through cost-recovery-based tariff structure and levels.

3/Annual interest on relent IDA Credit during construction is not significant enough in amount to be included. Grace period will end in 1996.

CHINA

SHIP WASTE DISPOSAL PROJECT

Xiamen Port

Income and Funds Flow Statement - Without Project
Y million

For year ending December 31,	Updated		Forecast				
	1989	1990	1991	1992	1993	1994	1995
Operating Revenues	50.1	55.7	66.6	79.6	95.2	113.8	136.6
Operating Expenses	30.6	32.8	39.1	46.1	54.5	64.3	75.9
Net Operating Income	19.5	22.9	27.5	33.5	40.7	49.5	60.7
Interest Expense	-	-	5.6	6.5	7.0	7.0	7.0
Non-Operating items--Net Dr/(Cr)	1.1	0.6	0.5	0.5	0.5	0.5	0.5
Net Income Before taxes	18.4	22.3	26.4	26.5	33.2	42.0	53.2
Taxes and payments to state	4.6	5.4	6.2	7.9	9.6	11.6	14.3
Net Income after Taxes	13.8	16.9	20.2	18.6	23.6	30.4	38.9
Add. Depreciation	2.4	2.7	3.0	4.0	5.0	6.0	6.0
Internal generation of funds	16.2	19.6	23.2	22.6	28.6	36.4	44.9
State contribution	11.9	16.8	18.0	8.0	30.0	30.0	30.0
Borrowings	7.7	22.3	40.0	40.0	10.0	-	-
Sources of Funds	35.8	58.7	81.2	70.6	68.6	66.4	74.9
Applications of Funds	20.0	33.2	60.0	50.0	50.0	50.0	50.0
Net Funds Flow	15.8	25.5	21.2	20.6	18.6	16.4	24.9
Add: Opening Cash Position	22.2	38.0	63.5	84.7	115.3	133.9	150.3
Cash Position Year End	38.0	63.5	84.7	115.3	133.9	150.3	175.2

Xiamen Port - Project Facilities - Financing Plan (1992-1995)
and Funds Flow - With Project
Y million

	Forecast				
	Total	1992	1993	1994	1995[1]
Project Facilities					
Financing Plan					
Capital Investment	34.0	2.3	11.4	15.8	4.5
Less: External financing	23.9	1.6	8.0	11.1	3.2
Port's contribution	10.1	0.7	3.4	4.7	1.3
Funds Flow					
Operating and maintenance expense					3.4
Depreciation					3.4
					6.8
Operating revenues[2]					6.8
Project facilities - internal cash generation	4.7	-	-	-	4.7
Less: Contribution towards project financing	10.1	0.7	3.4	4.7	1.3
Interest expense[3]	0.4	-	-	-	0.4
	10.5	0.7	3.4	4.7	1.7
Project-related surplus/(deficit)	(5.8)	(0.7)	(3.4)	(4.7)	3.0
Net funds flow from regular port operation	80.5	20.6	18.6	16.4	24.9
Consolidated Surplus/(deficit)	74.7	19.9	15.2	11.7	27.9

1/The project facilities become operational beginning 1995.

2/Notional amount equivalent to total operating expenses which will be targeted for collection through cost-recovery-based tariff structure and levels.

3/Annual interest on relent IDA Credit during construction is not significant enough in amount to be included. Grace period will end in 1996.

CHINA

SHIP WASTE DISPOSAL PROJECT

Growth Rates Assumed in Financial Forecasts

	1991 %	1992 %	1993 %	1994 %	1995 %
1. Dalian Port					
Existing Port Operations					
Operating revenues - annual increases	6.9	7.5	7.0	7.0	7.0
Operating expenses - annual increases	11.1	10.0	10.0	10.0	10.0
Annual average depreciation rate[1]	1.7	1.8	1.8	1.8	1.8
Annual average interest rate[2]	5.0	5.0	5.0	5.0	5.0
Project Facilities					
Operating and maintenance costs as a percentage of investment					10.0
Annual depreciation rate					10.0

Growth Rates Assumed in Financial Forecasts

	1991 %	1992 %	1993 %	1994 %	1995 %
2. Tianjin Port					
Existing Port Operations					
Operating revenues - annual increases	4.7	4.5	4.5	4.5	4.5
Operating expenses - annual increases	6.1	6.4	5.0	5.0	5.0
Annual average depreciation rate[1]	1.7	1.7	1.7	1.7	1.7
Annual average interest rate[2]	3.6	3.7	3.7	3.7	3.7
Project Facilities					
Operating and maintenance costs as a percentage of investment					10.0
Annual depreciation rate					10.0

Growth Rates Assumed in Financial Forecasts

	1991 %	1992 %	1993 %	1994 %	1995 %
3. Shanghai Port					
Existing Port Operations					
Operating revenues - annual increases	6.7	6.7	6.7	6.7	6.7
Operating expenses - annual increases	7.5	7.3	7.1	7.0	7.0
Annual average depreciation rate[1]	2.0	2.0	2.0	2.0	2.0
Annual average interest rate[2]	3.0	3.0	3.0	3.0	3.0
Project Facilities					
Operating and maintenance costs as a percentage of investment					10.0
Annual depreciation rate					10.0

Growth Rates Assumed in Financial Forecasts

	1991 %	1992 %	1993 %	1994 %	1995 %
4. Ningbo Port					
Existing Port Operations					
Operating revenues - annual increases	13.6	13.2	12.8	12.5	13.0
Operating expenses - annual expenses	12.3	11.1	10.0	10.0	10.0
Annual average depreciation rate[1]	3.0	3.0	3.0	3.0	3.0
Annual average interest rate[2]	3.0	3.0	3.0	3.0	3.0
Project Facilities					
Operating and maintenance costs as a percentage of investment					10.0
Annual depreciation rate					10.0

Growth Rates Assumed in Financial Forecasts

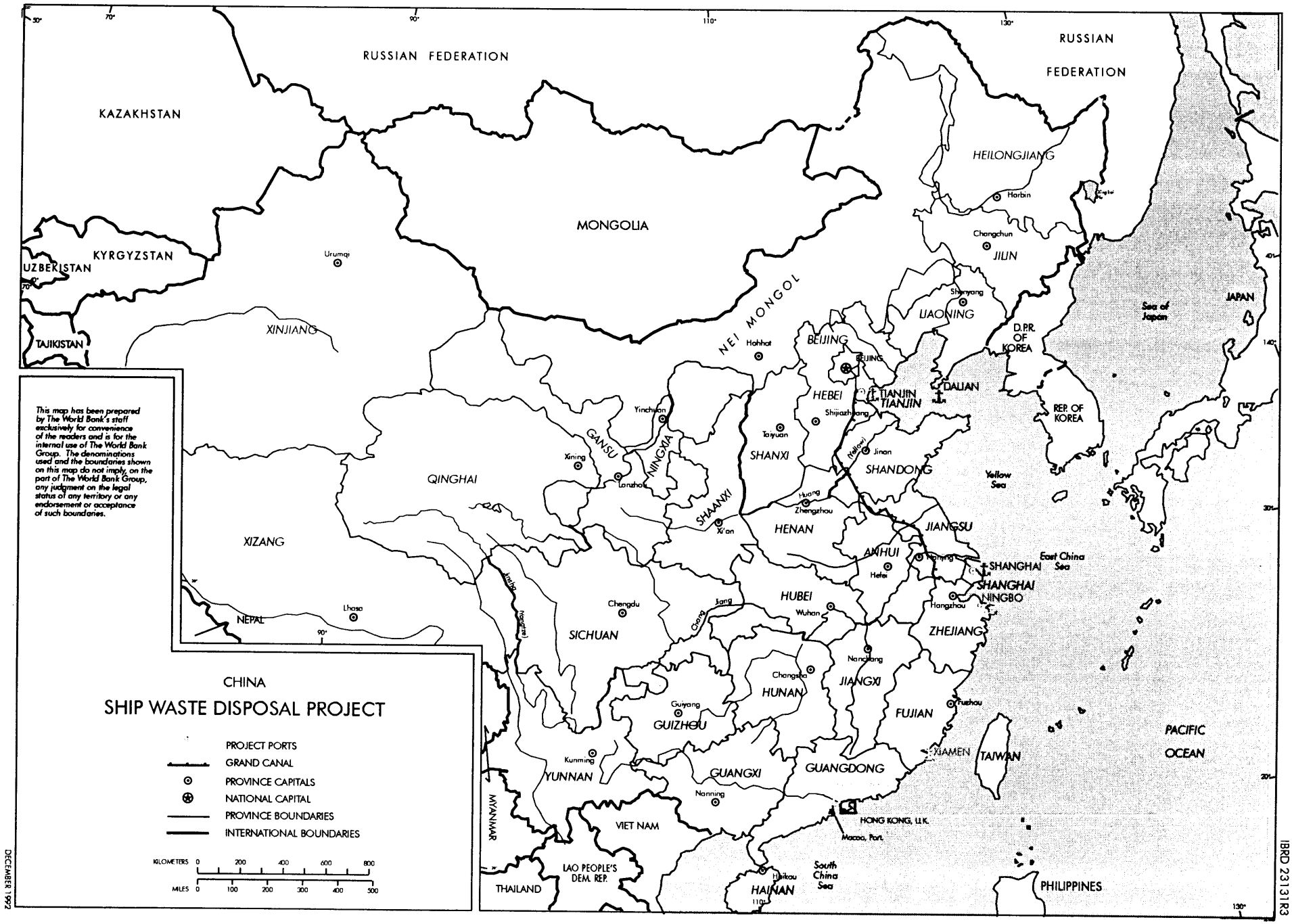
	1991 %	1992 %	1993 %	1994 %	1995 %
5. Guangzhou Port					
Existing Port Operations					
Operating revenues - annual increases	11.6	11.8	12.4	12.0	12.0
Operating expenses - annual increases	12.9	13.8	15.4	15.0	15.0
Annual average depreciation rate[1]	1.7	1.8	1.9	2.0	2.0
Annual average interest rate[2]	3.0	3.0	3.0	3.0	3.0
Project Facilities					
Operating and maintenance costs as a percentage of investment					10.0
Annual depreciation rate					10.0

Growth Rates Assumed in Financial Forecasts

	1991 %	1992 %	1993 %	1994 %	1995 %
6. Xiamen Port					
Existing Port Operations					
Operating revenues - annual increases	19.5	19.5	19.5	19.5	20.0
Operating expenses - annual increases	19.2	17.9	18.0	18.0	18.0
Annual average depreciation rate[1]	1.6	1.6	1.6	1.6	1.6
Annual average interest rate[2]	6.4	5.6	5.2	5.1	5.0
Project Facilities					
Operating and maintenance costs as a percentage of investment					10.0
Annual depreciation rate					10.0

[1] Depreciation: Because of the varying mix of the fixed assets and related depreciation from port to port, and within the same port from year to year, the rates do not follow any fixed pattern from year to year.

[2] Interest: Similarly, because of the varying mix of the long-term debt and related interest from port to port, and within the same port from year to year, the rates do not follow any fixed pattern from year to year.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Yellow Sea
D.P.R. OF KOREA
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HENAN
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ANHUI
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East China Sea
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Hangzhou
ZHEJIANG
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CHINA
SHIP WASTE DISPOSAL PROJECT
PROJECT PORTS
GRAND CANAL
PROVINCE CAPITALS
NATIONAL CAPITAL
PROVINCE BOUNDARIES
INTERNATIONAL BOUNDARIES
KILOMETERS 0 200 400 600 800
MILES 0 100 200 300 400 500
DECEMBER 1992
IBRD 23131R3