

Chapter 16
Environmental Assessment



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16.1 Initial Environmental Assessment

An environmental study is comprised of three steps: Preliminary Environmental Survey (PES), Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA). The procedure of the environmental study in this study is shown in Figure 16.1.1.

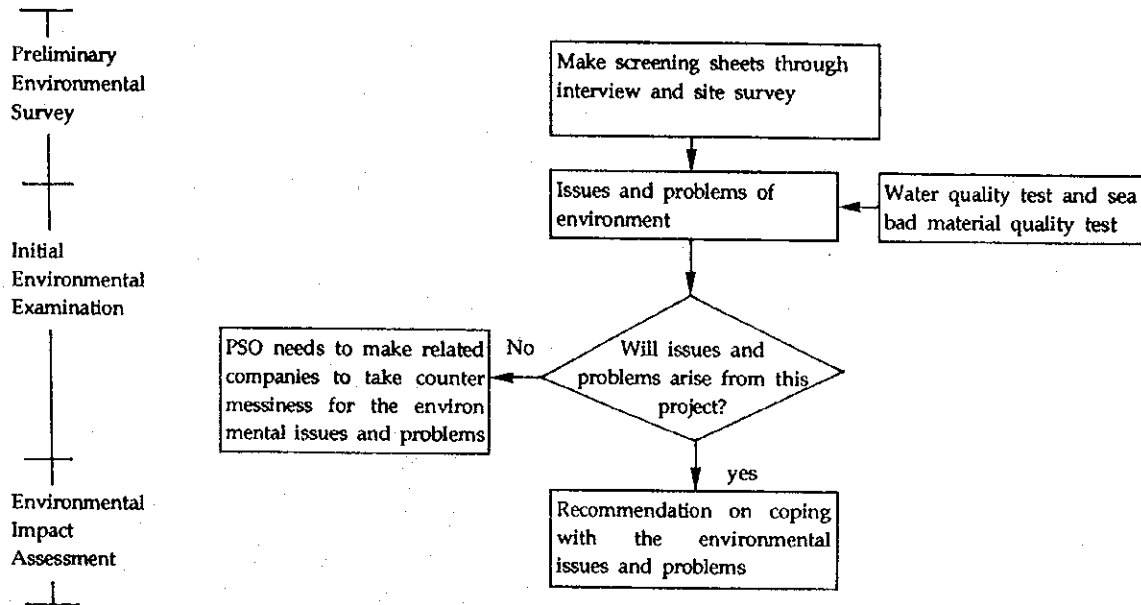


Figure 16.1.1 Procedure of the Environmental Consideration

16.1.1 Review of Present Water Quality

Water quality and sea bed quality tests were performed in November, 1993 and water quality was tested again in June, 1994 as part of IEE.

In this report, only results of the water quality test in June, 1994 are reported. Result of the previous tests on water quality and sea bed quality were reported in the progress report.

(1) Result of Water Quality Study at Imam Khomeini Port in June, 1994

*Location : See Figure 16.1.1.1.

1) Dissolved Oxygen (DO)

- a) Water flowing from Zangi (at low tide) contains a lot of DO. It is assumed that the flowing water is one of the oxygen supply sources.
- b) The point No. 17 at 6 km offshore from the port (see Figure 16.1.1.1) has been contaminated caused by port activities. Contamination is assumed to be widespread when oil spills occur. Extreme care is required when handling

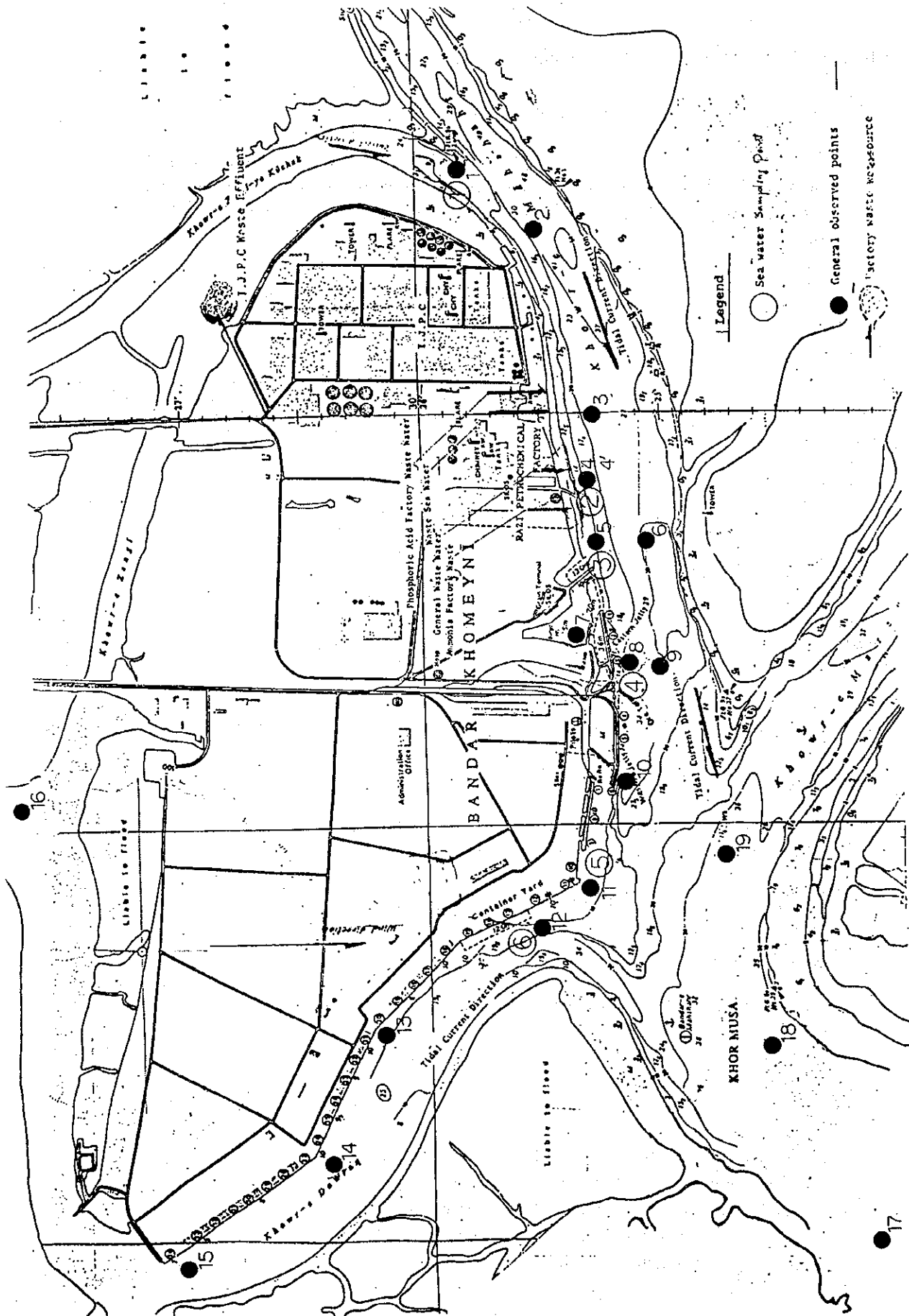


Figure 16.1.1.1 Location Map of Environmental Study at Imam Khomeini Port

chemicals, etc.

2) Turbidity

Transparency is poor (average transparency; 0.5 m), and when a turbidimeter is placed at -7 m, it registers a still higher turbidity than at the surface. This means it will be difficult to check and repair underwater structures, careful study is required at the time of construction.

3) Others

There are no other specific problems at present.

16.1.2 Initial Evaluation of the Environmental Conservation

In this section, the relation between the environmental problems which are extracted from the results of the screening and the Master Plan is identified. Each extracted problem is analyzed to determine whether an environmental impact assessment (EIA) is necessary or not. The screening sheet and scoping sheet of Imam Khomeini Port are attached to Appendix II-3.1,III-8.1.

1) Traffic and public facilities (item number in the screening sheet:3)

Residents near the port are likely to be deeply affected by vibration and exhaust gas of vehicles for sea transportation cargoes. Under the Master Plan, the volume of container and general cargoes are expected to largely increase. Most of these cargoes will be carried by trucks and trailers from the port to the inland and vice versa. Thus, a study on mitigation measures for these problems is required. Therefore, EIA should be carried out in the stage of the feasibility study.

2) Health and sanitation (item number in the screening sheet:7)

There is currently no waste water treatment plant in Imam Khomeini Port. In the Master Plan, the cargo handling volume is expected to greatly increase as is the population passing through the port such as workers and ships' crews. Thus, waste is also expected to increase at the port. This will be a serious problem at this port in the Master plan stage. Therefore, mitigation measures for this problem should be studied. EIA should be done in the stage of the feasibility study.

3) Waste Oil (item number in the screening sheet:8 and 19)

There is no waste oil disposal plant in Imam Khomeini Port at present. With the increase in cargo volume, the number of small crafts including work ships are also expected to increase. Disposal of used engine oil and belfast water will creat a problem sooner or later and thus an EIA is required.

4) Hazard (item number in the screening sheet:9)

In the Master plan, both the size and number of calling ships will increase. Accordingly, there is a greater likelihood of accidents, especially between small crafts and vessels. This problem can be prevented by navigation control at the entrance channel. Therefore, navigation control at the channel should be studied. EIA on this aspect should be carried out in the stage of the feasibility study.

5) Air Pollution (item number in the screening sheet:18)

Dust from aluminum and steel powders which are handled for imports are causing serious air pollution in the existing open storage area at the time of cargo handling. This air pollution will affect the health of workers at the port. This is one of the most serious issues at Imam Khomains Port. Therefore, mitigation measures should be studied in an EIA.

6) Water pollution (item number in the screening sheet:19)

Dead fish can often be seen at the basin in Imam Khomains Port. Toxic waste discharged from the chemical plant which lies east of Imam Khomeini Port is likely the reason. This problem is not directly related to the Master Plan. Therefore, the data on the waste at the basin in front of the chemical plant should be prepared as evidence. PSO should then transfer this data to EPA who should strongly urge the factories to adopt countermeasures.

Floating particles of oil are also observed at the basin. One of the reasons for this situation is likely the engine oil waste of crafts. This matter has already been mentioned in 3).

7) Offensive odor (item number in the screening sheet:23)

Strong offensive odor originating from the chemical plant to the east of Imam Khomeini Port is occasionally carried to the port by wind. Some workers reportedly feel nauseous at these times. Although this problem is not directly related to the Master Plan, odor problem should be studied in an EIA in order to improve the working environment.

8) Sea-bed Pollution

According to the result of the sea-bed material quality test, slightly high levels of heavy metals namely palladium, sulphur and arsenic were found.

This problem is assumed to be caused by chemical factories in up-stream areas of Musa River. Therefore, this problem is not directly related to this project. PSO needs to regularly inspect the sea-bed material quality, and collect relevant data. PSO will then be in a strong position to press related companies to take appropriate countermeasures.

16.2 Evaluation of Environmental Assessment

The result of the environmental assessment of the items selected in the Initial

Environmental Examination (IEE) at Imam Khomeini Port are summarized as follows:

- Increase in traffic congestion, traffic jams and accidents due to increase in traffic volumes:

The traffic volume generated at the port in the Short Term Plan will be about 1.5 times more than the current volume (1993/94). There is no need to expand the width of major roads in the vicinity of the port. But large vehicles passing through the central part of Sal Bandar City will create a dangerous situation. It is recommended that a bypass detouring Sal Bandar City be constructed as soon as possible.

- Increase of waste generated from the port:

The number of workers in the existing port area will not substantially increase in the Short Term Plan. But the port activity will be expanded in the Short Term Plan and the Master Plan. The cargo handling volume and the number of calling ships will be increased in the Short Term Plan. Thus, the waste generated from the port area is expected to increase. Therefore, it is necessary to study the construction of a waste treatment plant.

- Increase of waste oil discharged from vessels:

According to the site survey at Imam Khomeini Port, oil spills were observed on the surface near the quay-wall. Vigilant monitoring and guidance for all ships (including small ships) to prevent the volume of bilge from exceeding the maximum permissible level may be the solution to this problem.

- Accidents due to the increased number of vessels:

The number of vessels in the Short Term Plan is about twice the current number. The width of existing channel is about 220 meters at the narrowest point, and the length of the channel, which is less than 300 meters in width is 37 km. No increase in the number of accidents is expected because the maximum vessel size is 252 meters, the number of calling ships per day is less than seven on average, the vessels longer than 200 meters will represent less than 20 % of the total, and the compulsory pilot system has been adopted.

- Air pollution by cargo handling operations and cargo storage in open yard:

Imam Khomeini Port has a problem of air pollution by aluminum and iron powders during cargo handling and from the cargo stored in the open yard. Water spraying during cargo handling and at open storage space, lowering the ground level of the storage space and covering the belt conveyors completely will solve the problem.

16.3 Preventive Measures

Based on the Environmental Impact Assessment (EIA), it is recommended to monitor bilge generated from vessels and give guidance to prevent it, and implement dust prevention measures during the cargo handling operations and at the open storage spaces and study the construction of a waste treatment plant. Above items should be

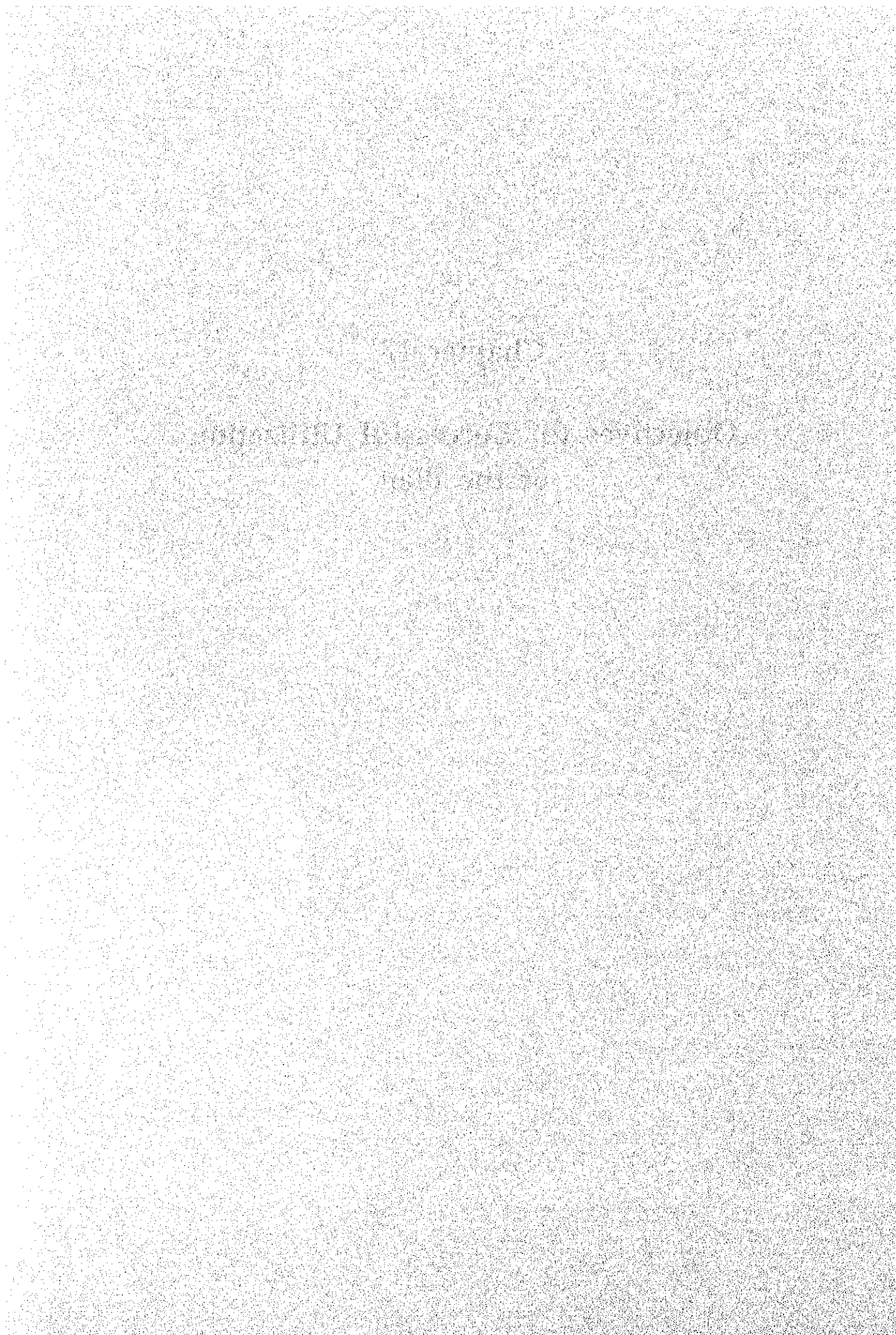
implemented in the Short Term Plan.

To cope with urban population increase in the port vicinity and the expansion of activities in Imam Khomeini Port in the post Master Plan, we recommend construction of a waste oil treatment plant, a sewage treatment plant and a waste treatment plant utilizing the vast area surrounding Imam Khomeini Port.

According to the result of this study, routine inspection system for air, water and sea bed qualities in each port area should be established, in a addition, a simple test laboratory at each of the major ports is required.

Chapter 17

Objectives for Successful Utilization of the Plan



Chapter 17 Objectives for Successful Utilization of the Plan

17.1 Monitoring and Review

Investment according to the long-term plan (or master plan) is a must for both the economical construction and smooth operation of the port. PSO apparently recognizes meaning of the master plan since the completion of previous master plans for the major ports prepared by ADIBI-HARRIS in 1974. These plans are maintaining their key positions in the recent Iranian port development.

All the facilities specified in the master plan were reflected on the forecast data of cargo demand together with type of cargo. However actual figures may deviate from them due to changes in various social and economic environments.

For example, an imbalance between demands and supplies presently appears at the wharf utilization of Imam Khomeini port. Some of the existing berths have a high occupancy rate, however, the rate at adjacent berths is extremely low. Although a detailed study to cope with this situation is required, following countermeasures may be useful.

- (1) Review of cargo forecast based on the latest data
- (2) Review of the master plan
- (3) Review of the implementation schedule

These should be conducted periodically. The implementation will be adjusted accordingly as follows.

- (1) Implementation in advance
- (2) Postponing of implementation
- (3) revision of previous scope of works
- (4) Modification of the existing facilities

Taking the above into account, it should be achieved to maintain a reasonable occupancy rate but also to provide the facilities which port users require. In order to modify and transfer the facilities to meet the new requirements, several important points should be taken into account during the master plan preparation, one of which is flexibility.

- (1) General arrangement of the port facilities maintaining of flexibility to absorb the possible changes of demands in the future.
- (2) Flexibility in the design criteria

"The flexibility" in port development can be generally achieved by taking the following planning concepts into consideration, although these might be selected carefully by the port planners.

- (1) Fixed facilities including transit sheds and warehouses should not be installed

until it is absolutely necessary.

- (2) Open space should be kept as wide as possible.
- (3) Future cargo handling system should be forecasted and taken it into the design criteria.
- (4) Waterfront structures should be provided with additional capacity to accommodate large vessels in the future.

PSO has taken these into account in the previous master plan of Iman Khomeini port. Five berths, No. 11 to No. 16, located at the most heavily used wharf are capable of supporting large live loads of container wharf crane, although they have only one container wharf.

This decision made by PSO in 20 years ago can be supported even at present since the containerization is a dominant trend of international maritime transport.

17.2 Consideration to Better Port Environment

The Study Team has conducted field investigation regarding both water quality and seabed material quality at Anzali port and Imam Khomeini port in December 1993.

The dissolved oxygen (DO) is an important parameter to judge water quality in respect of organic matter contamination. Organic materials contained in water consume oxygen in the course of their stabilization, thus the higher contamination, the lower DO.

Water quality by the dissolved oxygen (DO) is 12 mg/l and 4.5mg/l at Anzali port and Imam Khomeini port respectively. The former figure indicates good environment as far as oxygen content is concerned. The latter value is slightly beyond an acceptable level. It also should be noted that the existing channels of both ports provide fishery boats with access to the fishing banks.

PSO performed its best efforts to conform to the environmental preservation policies prepared by the Department of Environment (DOE). There are two basic duties levied on PSO in respect of environmental management in its premises, including the port wet basin and approach channel as follows.

- (1) To inform DOE of any contamination incident on the seawater except oil spill.
- (2) To manage and control any contamination including oil spill at its premises by any measure.

In order to get confirmation of the former, it is recommended that PSO will monitor the environmental condition of its premises. In case of any violation of DOE regulations, PSO shall immediately inform DOE. In order to conform to the latter PSO prepared rules (or instructions) in order to protect its premises including various

clauses such as:

- (1) Category of wastes
- (2) Oily water from engines
- (3) Oily water from engine room
- (4) Other like bilge

PSO Port Guard Department will carefully watch vessel discharges and take action if an incident happens. In case of serious violation of laws and/or rules, the captain of target vessel will be inquired and sent to court for judgment. This means that environmental problems caused by oil spill should be fully managed by PSO even without particular assistance of DOE. These regulations are prepared by DOE, Navy, PSO and other governmental agencies and include the preventive measures of oil spill.

Next stage to come to PSO will be implementation of these rules at site. It is expected that PSO will perform necessary actions in order to prevent its premises from serious contamination by oil spillage. These actions will also need to last the structure life long.

17.3 Periodical Maintenance

PSO has conducted its efforts to provide the existing facilities with the required maintenance services. This can be seen at the waterfront facilities, namely the rehabilitation works of the Western Jetty and the Grain Jetty of Imam Khomeini port. However there are several damaged structures which require both periodical maintenance works and urgent rehabilitation.

- (1) Steel Sheet pile wall and Steel Piles corrosion

Concrete protection works to them are presently inadequate. Coping wall should cover the exposed steel surface down to the low water level.

- (2) Defects of concrete structures

Some of the existing marginal wharfs consisting of concrete structures are seriously damaged that their reinforcement bars are exposed to air. Corrective measures should be conducted as soon as possible.

- (3) Siltation at the port basin

Maintenance dredging should be performed in order to keep both channel and basin of the required water depth.

Maintenance works are required for not only ensuring port users of safety but also extending the life of existing facilities. It is recommended that the required maintenance works should be evaluated during the design stage by totaling the initial

cost and maintenance cost.

In spite of PSO efforts, more economical maintenance works can be conducted if proper preparation works on the objective structures are carried out. Findings and recommendations on this aspect are shown below.

- (1) Inadequate identification of required maintenance works is observed. It is recommended to prepare a list of facilities together with possible damage.
- (2) Insufficient inspection works is also observed. Monitoring the present usage and damage inspection should be conducted periodically. Inspection survey should be extended to underwater structures, under surface of deck structure and embedded facilities in the earth.

Maintenance work on the structures can be divided into two categories, namely the routine maintenance and the urgent rehabilitation. The former consists of preventive measures and the required cost of which is minor, however the latter consists of corrective measures against the large scale damage and the required cost of which is large. According to past experience, if the preventive maintenance is appropriately performed, the required cost for the corrective maintenance works will be minimum.

17.4 Training System for Staff

17.4.1 Objectives

- (1) Improvement of staff's capability

To be a port which can attract more cargo and passengers, efficient management and operation are essential. At PSO central office and the port authority offices, employees in each department should control port activities appropriately to materialize efficient management and operation - quick cargo handling, farsighted investment, profitable financial management and so on.

The objective of employee training is to improve the capability of each work, which in turn will lead to efficient port management and operation.

Through training, employees should gain expert knowledge, leadership ability, skill to operate port equipment, technical criteria including preventive maintenance and so on. They should understand the current port condition and manage and operate the ports considering problems which are expected to occur in future. In addition, to gain more effect, they should make efforts to self-educate.

The concrete objectives by kinds of employees are as follows.

- 1) For all staff

Training courses for all staff begin at the time of employment and continue periodically.

By attending these courses, employees gain basic knowledge on general administration and leadership ability. Employees will gradually develop a broader understanding of

the nature of ports which will help them to cope with problems of port administration and operation at site.

2) For Secretaries (Staff mainly engaged in management or finance)

By attending training courses on general administration, financial management, accounts system, related laws and regulations and so on, secretaries gain a better understanding of port management, and will thus execute their duties more effectively.

3) For Engineers (Staff mainly engaged in construction or maintenance and repair)

By attending training courses on civil engineering, architecture, electrical engineering, mechanical engineering and so on, engineers gain a better understanding of port construction and maintenance, and will thus execute their duties more effectively.

4) For Operators (Staff mainly engaged in marine and port operation)

By attending training courses on navigation, cargo handling, operation of port equipment and so on, operators will attain a higher level of skill and thus the efficiency of port operations will be enhanced.

5) For consist (staff mainly engaged in economical matters)

(2) Increase in the number of educated staff

It is desired that highly qualified employees (employees who have graduated from university or postgraduate courses, employees who have completed training courses) account for a certain percentage of all employees engaged at a port authority office. The number of educated staff at a representative Japanese port (the port A) is shown in Table 17.4.1.1 for reference. At the port A, there are 161 personnel with university or postgraduate educations, representing 17% of all employees. In addition, there are 236 personnel who are also highly educated (graduates from special schools, marine specialist, other specialists). If the number of employees from the above two categories are added together, a total of 397 highly qualified personnel of 44% of all employees are employed at Port A.

At IKPAO, the number of highly qualified employees (university-trained employees and postgraduate employees) is usually about 10 personnel, in 1994 representing 0.6% of total employees.

Considering the above case, it is desired that educated employees account for about 40 % of total IKPAO employees.

Table 17.4.1.1 The Number of Educated Staff at the Port A

	(Personnel)			
	Secretarys	Engineers	Labors	Total
High school-trained staff	91	135	487 (216)	713 a:(216)
Special school-trained staff	2	18 (4)	0	b:20 (4)
University-trained staff	67	56 (3)	0	c:123 (3)
Postgraduate staff	1	27	0	d:28
Total	161	236 (7)	487 (216)	884 (223)

Note: (): The number of specialists (marine specialists and other specialists)

: "151 personnel"=(c)+(d)

: "236 personnel"=(a)+(b)

17.4.2 Training Organs

(1) Necessity of Training Organs

As cargo volume increase and port equipment becomes more sophisticated, employees with extensive knowledge of the various port functions and port-related activities are indispensable to meet the demands of users.

To that end, special training organs which will provide trainees with the opportunity to gain first-hand knowledge need to be established. The benefits of such a system would justify the high cost of introducing it. For example, trainees would be able to practice operating port equipment in a controlled environment and then utilize this experience during actual operations.

As mentioned, however, a considerable investment to secure large sites for port facilities, the latest equipment and so on would be required. If the port authority offices were to bear the cost by themselves, tariff levels would have to be raised which might weaken their competitive position. Therefore, special training organs which can raise funds to provide training should be established.

(2) Kinds of Training Organs

Training organs should provide both theoretical and practical training. Through theory training, trainees will gain basic and special knowledge on port management and operation. Through practical training, trainees will operate port equipment first hand and attain a higher level of skill.

Special schools, junior colleges and colleges should be established to teach theory. Selected employees engaged in PSO should enter these schools and colleges and study in special courses. PSO will then be able to employ highly educated personnel - the graduates from those schools and colleges.

Institutes for port operation training should be established for practical training.

(3) Sources of Revenue for Training Organs Management

Entrance and tuition fees, and subsidies from the central Government should be allocated for management expenditures of special schools, junior colleges and colleges. The port training institutes should charge training fees and accept subsidies from the Government; in addition, related organizations (PSO, marine public organizations, marine private companies) could serve as sponsors. This income would be allocated for management expenditures and the purchase of new equipment.

17.4.3 Training Programs

(1) Programs for all staff

An example of the programs for all employees is shown in Table 17.4.3.1. Through these programs, improvement of their ability to understand present condition and problems of ports is expected. In addition to the matters shown in Table 17.4.3.1, other programs that focus on current problems related to ports should be prepared.

(2) Programs for Secretaries and Engineers

An example of the programs for secretaries and engineers is shown in Table 17.4.3.2. Through these programs, it is expected that they will gain special knowledge of various port functions. In addition to the matters shown in table 17.4.3.2, if necessary, the selected employees engaged in PSO should study in colleges or universities to gain higher and the latest knowledge.

(3) Programs for Operators

There are various types of operation in port activities - marine operation, cargo-handling and so on. Operators should have professional knowledge of each port function and attain a higher level of skill. As an example of port operation, a program for cargo handling operators is shown in Table 17.4.3.3. In addition to the matters shown in table 17.4.3.3, as daily training, skilled operators should guide unskilled ones to raise the efficiency level.

(4) Programs for Economist

(5) Programs for Economist

Table 17.4.3.1 Training Program for all staff

course	program	object
New staff training	Imparting basic knowledge of general administration and port management	newly employed staff
Middle staff training	Imparting advanced knowledge of general administration and port management. Heightening self-awareness as a middle staff	middle staff who have considerable work experience
Excutive staff training	Deepening staff's understanding of the problems related to port management. Improving management ability(command ability, problem settlement ability, etc.)	executive staff

Table 17.4.3.2 Training Program for Secretaries and Engineers

course	program
Secretaries Training	Administration, Port managemet, Related laws and regulation, Finance, Procurement, Accounting, etc.
Engineers Training	<Civil engineering> Policy of civil engineering, Port construction, Road construction, Bridge construction, River engineering, City planning, Railway construction, soil enginring, etc.
	<Architecture> Policy of construction, Construction planning, Construction designing, Execution of construction work, Appurtenant work, etc.
	<Electrical engineering> Electrical equipment, Illumination engineering, Electronics, etc.
	<Mechanical engineering> Mechanical material, Thermal dynamics, Mechanical designing, Water dynamics, etc.

Table 17.4.3.3 Training Program for Operators

Subject	Program
Theory	Port management, Related laws and regulation, Conveyance, Cargo handling, Electric engineering, Applied dynamics, Moter engineering, Mechanical engineering, Security and sanitation, Information processing, etc.
	<p><Operation> Operation of gantry crane, transfer crane, straddle carrier forklift. Inspection and maintenance, etc.</p>
	<p><Cargo handling> Stacking, Container vanning, handling of large sized cargo, Wiring, etc.</p>
Practical skill training	<p><Adjustment and maintenance> Inspection, adjustment, and maintnace of cargo handling equipment and tools, etc.</p>
	<p><Assembling> Palettes assembling, Wire-sling, Rope-sling</p>
	<p><Welding> Basic work of electric and arc welding</p>
	<p><Tallying and sorting> Tallying, sorting, marking</p>
	<p><Information processing> Basic programing of computer, Practice</p>
	<p><Security and sanitation> Tidying, Tools for security, Protector</p>

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