

ANNEX D: 2004 ENVIRONMENTAL IMPACT ASSESSMENT

DHA Cogen Ltd; Power and Desalination Unit, Karachi



ENVIRONMENTAL IMPACT ASSESSMENT (EIA)



Prepared By:

ECTECH - Environment Consultants

Suite # 4, 2nd Floor, Link Arcade, Model Town Link Road, Lahore

October 13, 2004

DHA Cogen Ltd; Power and Desalination Unit, Karachi

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Prepared By:
ECTECH -Environment Consultants
Suite #4, 2nd Floor, Link Arcade, Model Town Link Road, Lahore
October 13, 2004

CONTENTS

	Page
EXECUTIVE SUMMARY	i
1.0 INTRODUCTION	1
2.0 DESCRIPTION OF THE OBJECTIVES OF PROPOSAL	7
3.0 DESCRIPTION OF THE PROPOSAL AND ITS ALTERNATIVES	8
3.1 The status of the proposal in the project cycle (pre-feasibility, feasibility or detailed design)	8
3.2 Description of the planning, design and implementation stages	8
3.2.1 Planning	8
3.2.2 Design	9
3.2.3 Implementation	9
3.3 The requirements for raw materials, water, energy and equipment	10
3.3.1 Raw materials	10
3.3.2 Water	10
3.3.3 Energy	11
3.3.4 Equipment	11
3.4 The planed operational characteristics-hours of operation, processes , products	11
3.4.1 Hours of operation	11
3.4.2 Process	11
3.4.3 Products	11
3.5 Visual aids (maps of the area, site and plant layout, flow charts of production, and photographs of the site and similar projects)	11
3.5.1 Location map	11
3.5.2 Plant layout	12
3.5.3 Flow chart/sheet of production process	12
3.6 Comparison of proposal options (size, siting, technology, layout, energy, sources, sources of raw material)	12
3.6.1 Size	12
3.6.2 Siting	12
3.6.3 Technology	12
3.6.4 Layout	13
3.6.5 Energy sources	13
3.6.6 Sources of raw materials	13
3.7 Summary of the technical, economic and environmental features of the proposal	13

3.7.1	Technical	13
3.7.2	Economic	13
3.7.3	Environmental	14
4.0	DISCUSSION OF PROPOSAL AND CURRENT LAND USE POLICIES	14
4.1	Land use	14
4.2	Regulatory framework	14
4.2.1	Deregulation of the economy	14
4.2.2	Import policy	14
4.2.3	Infrastructure facilities	15
4.2.4	Incentives	15
5.0	DESCRIPTION OF EXISTING AND EXPECTED CONDITIONS	15
5.1	Spatial and temporal boundaries adopted for the various aspects of the study	15
5.2	Existing (baseline) conditions of the biophysical and socio-economic environment, trends and anticipated future environmental conditions should the project not go ahead	15
5.3	Environmentally sensitive areas of special or unique value (Physical resources of the project area: Topography and geology, Soils and Climate; Ecological resources: Fisheries and aquatic biology, Biodiversity, Forestry, Wildlife scientific institutions, Socio-economic and Cultural and other heritage)	16
5.3.1	Physical resources of the project area	16
5.3.1.1	Topography and geology	16
5.3.1.2	Soils	17
5.3.1.3	Climate	17
5.3.1.4	Water	17
5.3.2	Ecological resource	17
5.3.2.1	Fisheries and aquatic biology	17
5.3.2.2	Biodiversity	18
5.3.2.2.1	Forestry	18
5.3.2.2.2	Wildlife	18
5.3.2.3	Scientific institutions	19
5.3.2.4	Socio-economic, cultural and other heritage	19
5.4	Existing socio-economic conditions	19
5.4.1	Population and communities	19
5.4.2	Industries	20
5.4.3	Cultural and aesthetic values	20

6.0	EVALUATION OF IMPACTS AND MITIGATION MEASURES	21
6.1	Assessment of any environmental impact on local population and the environment during construction and operational phase	21
6.1.1	During construction	21
6.1.1.1	Pollution impacts	21
6.1.1.2	Tree cutting	22
6.1.2	During operation stage	22
6.2	Potential socio-economic impacts	22
6.3	The relevant environmental data and predictive methods used and any underlying assumptions made	22
6.3.1	Base line environmental data	22
6.3.1.1	Ambient Air Quality	23
6.3.1.1.1	Gaseous	23
6.3.1.1.2	Particulates	23
6.3.1.1.3	Noise Levels	23
6.3.1.1.4	Water Quality	24
6.3.2	Gaps in knowledge and uncertainties encountered	24
6.4	Compliance with relevant environmental standards	24
6.4.1	Effluent analysis	24
6.4.2	Emissions	24
6.4.2.1	Gaseous	24
6.4.2.2	Particulate matter	24
6.4.2.3	Noise Levels	25
6.5	Assessed significance of the impact stating the standards or criteria used as a basis for judgment	25
6.6	Possible measures for avoiding or mitigation the impact	26
6.6.1	Wastewater	26
6.6.2	Emissions gaseous and particulate matter	26
6.6.3	Particulate matter	26
6.6.4	Noise Levels	26
6.6.5	Solid wastes	27
7.0	ENVIRONMENTAL MANAGEMENT PLAN, MONITORING PLAN AND PROPOSED TRAINING	27
7.1	Description of the proposed mitigation actions	28
7.1.1	Effluents	28
7.1.2	Gaseous emissions and particulate matter	28
7.1.3	Noise levels	28
7.1.4	Solid wastes	28
7.2	Schedule for mitigation	28

7.3	Assigning responsibility for implementation (by name or position)	29
7.4	Monitoring program to assess performance	29
7.5	Reporting and reviewing procedures	30
7.6	Training needs	30
7.6.1	Waste treatment plant operation	30
7.6.2	Environment quality control laboratory	30
7.6.2.1	Gaseous monitoring	30
7.6.2.2	Effluent testing laboratory	31
8.0	REFERENCES	32
9.0	SOURCES OF DATA AND INFORMATION AND LIST OF REFERENCE MATERIAL USED	34
10.0	TEAM MEMBERS WHO CARRIED OUT THE STUDY AND PREPARED THE EIA	35
11-	TERMS OF REFERENCES FOR THE ENVIRONMENTAL REPORT	37
ANNEXURES:		
ANNEXURE---I	Plant Location Map	38
ANNEXURE---II	Pakistan Environmental Protection Act-1997	39
ANNEXURE---III	Guidelines for the Preparation and Review of Environmental Reports	64
ANNEXURE---IV	Ambient Air Monitored Data	69
ANNEXURE---V	Ambient Particulate Matter Monitored Data	70
ANNEXURE---VI	Baseline Noise Level Monitored Data	71
ANNEXURE---VII	Arabian Sea Water Analysis Report (Near Village Restaurant)	74
ANNEXURE---VIII	National Environment Quality Standards (NEQS)	75
ANNEXURE---IX	Guidelines for Self-Monitoring and Reporting by the Industry	81

ANNEXURE--X	List of Major Equipment	91
ANNEXURE--XI	Process Flow Sheet for Power Plant/Plant Layout	92
ANNEXURE- XII	Process Flow Sheet for Potable Water Production/Plant Layout	93
Photo Logs		94

EXECUTIVE SUMMARY

M/S Defense Housing Authority (DHA) Cogen Limited (DCL), D-35, block-5, Clifton, Karachi, are in the process of establishing a combined cycle power plant with 94 MW power production capacity and a twin plant for production of 3 MIGPD of potable water for their supply to the residents of the DHA, Karachi. This twin activity will be installed at plot No. DSL-1, Pakistan Defence Officers Housing Society, Phase-VIII, Karachi.

In order to comply with Section 12 of the Pakistan Environment Protection Act 1997 (PEPA-1997), this Environment Impact Assessment (EIA) Report is being submitted to the Environment Protection Agency (EPA), Karachi, Government of Sindh, for getting No Objection Certificate for the project to be put on ground.

- **Title and location of the proposal:**

The project title is "DHA Cogen Ltd; Power and Desalination Unit". It will be installed at plot No. DSL-1, Defence Housing Society, Phase-VIII, Karachi.

- **Head Office:**

D-35, Block -5, Clifton, Karachi.
Telephone: 9221-586789; Fax: 9221- 5869789

- **Name of the proponent:**

DHA Cogen Ltd; (DCL).

- **Name of the organisation preparing the Environmental Report:**

ECTECH -Environment Consultants, Flat No. 4, 2nd Floor, Link Arcade,
Model Town Link Road, Lahore. Phone: 042-5887517, 5855508; 5841688
Fax: 042-5855508 & 5830087. E-mail: ectech_ectech@yahoo.com.

Brief outline of the proposal:

i-Brief

M/S Defense Housing Authority (DHA) Cogen Limited (DCL), D-35, block-5, Clifton, Karachi, plans to establish a 94 MW (ISO) integrated Power Generation and Water Desalination Plant in Karachi the first such plant in Pakistan. The plant will be installed at plot No. DSL-1, Defence Housing Society, Phase -VIII, Karachi. Agreement to the effect of siting the plant at this site has been signed with M/S Pakistan Defence Officers Housing (P.D.O.H.) Authority, Karachi.

The power will be sold to Karachi Electric Supply Corporation (KESC) for its onward supply to the P.D.O.H. Authority, Karachi. Under an agreement, the quality potable water to be produced at the rate of 3 Million Imperial Gallons Per Day (MIGPD) will also be supplied to the residents of P.D.O.H. Authority, Karachi.

Natural gas will be fuel for power generation for which an agreement has been concluded with the Economic Coordination Committee (ECC). Sea water will cater for the needs of the power plant as well as the plant for production of potable water.

As regards environmental aspects of the two activities gaseous emissions, particulate matter, noise levels and effluents will be in compliance with the National Environmental Quality Standards (NEQS). In order to ensure compliance with the NEQS, an Environmental Management Plan (E.M.P.) and Monitoring Plan (M.P.) have been recommended for action. Training needs for the staff to execute these plans have been identified. In order to further ensure environmental compliance of the project activity, third party biannual environmental monitoring will also be carried out.

ii- Contribution to economic uplift of the people/ job opportunities

Job opportunities to about 1200 persons will be available during construction phase, while during regular operations of the plant about 60 people will be employed. In other words, if a family unit of 6 members is taken into account then 7200 and 360 people will be economically benefited from the plant activity during construction and regular operations phases respectively.

iii- Salient features of the project proposal

Karachi is hard hit for drinking water availability as well as electricity. The project operations will supply 94 MW power and 3 MIGPD quality drinking water to the residents of the city. It will thus provide relief to a fairly large cross section of the citizens of Karachi through the provision of these two important commodities to support life system.

During construction around 1200 people will get jobs while during regular operations about 60 persons earn their livelihood.

The proposal takes into account the reasons to select the present site, while describing also the existing biophysical and socio-economic environment, environmental features of the area around like water, air, soil, structures, vegetation, crops, biodiversity, scientific, socio-economic, historical buildings, cultural and heritage.

The proposal takes stock of logical, technical, scientific and methodological aspects of the project on the over all basis. It concludes that none of the important elements/segments of environment including also especially human health will be affected from the project activity. Rather it will add to the improvement for the good of the residents of the area especially and the project operation will be environmentally sound and in accordance with the NEQS.

- **The major impacts**

Major impacts from the project activity including environmental and economic are discussed hereunder:

- i- **Environmental impacts**

Under no environmental management action, environmental impacts from the project activity may be in the form of:

- Gaseous emissions of Nitrogen oxide (NOx) and Carbon monoxide (CO).
- Noise pollution.
- Effluent.

Mitigation of all the possible adverse impacts of the above described pollutants on various elements/segments of environment i.e. population, air, water, structures, soil, vegetation, wildlife, biodiversity etc are described. For more detailed account reference be made to serial 5.3.

- ii- **Economic impacts**

Economic benefits from the project will appear in the form of direct job opportunities (sl. ii above) in addition to contribution to boost construction industry thus adding indirectly to economics and general development of the city of Karachi and indirect generation of more jobs for all categories of the masses. It will also generate economic impacts related to the power consumption and down stream industry.

- **Recommendations for mitigation and compensation**

There will not be any disturbances in any of the segments of environment i.e. land use, landscape, resettlement of human beings, water bodies, social or cultural values or heritage or else. Therefore, there is no question of mitigation or compensation with regard to the project activity at any time or any level.

- **Proposed monitoring**

An Environmental Management Plan has also been recommended to further ensure safeguard against any possible environmental damages. For its details reference be made to serial # 7.0.

1.0 INTRODUCTION

M/S DHA Cogen Ltd; D-35, block-5, Clifton, Karachi, are in the process of installing a combined cycle power plant with 94 MW production capacity. As twin activity, 3 Million Imperial Gallons Per Day (MIGPD) of potable water will also be produced. Both the power and the potable water will be supplied ultimately to the Defence Housing Authority, Karachi. Natural gas will be the fuel to run the plant. The project is to be sited at Plot No. DSL-1, Phase VIII, DHA,--- ANNEXURE-I. The total cost of the project is estimated at US\$ 106.0

M/S Siemens AG- Power Generation, Germany are to supply the equipment for the power plant and M/S Alfa Laval Copenhagen A/S will supply technology and plant for the production of potable water. Agreements for the supply of equipment and technologies have been signed with both these companies.

The project activity is going to fulfill a vital need of power and acute shortage of potable water for the people of Karachi. In this case the residents of Defence Housing Authority, Karachi will be the direct beneficiary. Additionally, the project activity is going to add colossally to the economic uplift of the country as a whole and specifically more so for the people of Karachi and the Province of Sindh.

The project activity will provide jobs to about 1200 people during construction and 60 people during regular operation.

Major raw materials required for the project activity include Natural Gas and water from the sea. A contract has already been signed with M/S Economic Coordination Committee (ECC) for supply of gas. Raw water from the Arabian Sea will be taken.

To comply with the legal requirement of the Pakistan Environment Protection Act 1997 (PEPA--1997), Section 12 --- ANNEXURE-II; this Environment Impact Assessment (EIA) Report is being submitted to the Environment Protection Agency (EPA), Karachi, Government of Sindh, for ultimate issuance of No Objection Certificate (N.O.C.) by the said agency. This EIA Report, as desired by the EPA, has been prepared according to the format prescribed by the "Guidelines for the Preparation and Review of Environmental Reports, October 1997"--- ANNEXURE-III.

Title and location of the proposal:

The project title is " DHA Cogen Ltd; Power and Desalination Unit". It will be installed at:

Plot No: DSL-1, Defence Housing Authority, Phase-VIII, Karachi.

Head Office:

D-35, Block -5, Clifton, Karachi.
Telephone: 92-21-586789; Fax: 9221- 5869789

Name of the proponent:

M/S DHA Cogen Ltd. Karachi.

Name of the organization preparing the Environmental Report:

ECTECH –Environment Consultants, Flat No. 4, 2nd Floor, Link Arcade, Model Town Link Road, Lahore.
Phone:042-5887517, 5855508; 5841688 Fax: 042- 5855508 & 5830087
E-mail: ectech_ectech@yahoo.com; horizon@itids.com

Brief outline of the proposal:

i-Brief

M/S DHA Cogen Ltd, D-15, Block-5, Clifton, Karachi are putting up a combined cycle power project with installed capacity of 94 MW. As co activity heat from the exhaust gases will be utilized to produce 3 Million Imperial Gallons Per Day (MIGPD) of quality potable water. The project cost is estimated at US\$ 106.0 million. Both the power and the potable water will be supplied to the residents of the Defence Housing Authority, Karachi. An agreement to this effect has already been signed between the two parties.

Natural gas and water are among the major raw materials for the project activity. An agreement has been finalized with M/S Economic Coordination Committee for supply of the gas. Raw water will be extracted from the Arabian Sea.

While M/S Siemens AG-Power Generation, Germany will supply equipment for the power plant, M/S Alfa Laval Copenhagen A/S provide equipment and process technical know how for the production of potable water. Agreements to these effects have also been signed between the two contracting parties.

ii- Contribution to economic uplift of the people/ job opportunities

During construction phase, job opportunities to about 1200 persons will be available. During regular operations of the plant about 60 people will employed. In other words, if a family unit of 6 members is taken into account then 7200 and 360 people will be economically benefited from the

plant activity during construction and regular operations phases respectively.

iii- Salient features of the project proposal

Karachi is seriously hit for power. Even more important and of vital need is supply of safe drinking water to the residents of the city. Though both the problems are of vital importance, yet the later one is of more significance than the former.

The project activity is going to fulfill both of these vital needs to a sizeable extent, through the supply of 94 MW power and 3 MIGPD of quality drinking water. This project will rather be a trend setter for others to follow the suit for convenient and assured provision of these vital needs of the people. Due to the assured quality of potable water to be supplied through the project activity, safety against water borne diseases like viral hepatitis, infectious hepatitis, gastroenteritis, typhoid, paratyphoid, dysentery, cholera, diarrhea, nausea, vomiting, jaundice, skin irritation, allergy, leprosy, bilhazia and so on will be an additional advantage of great importance from health point of view.

This project proposal also takes into account various stages of the project completion from planning to design and implementation stages, rational for the present site and technology selection.

The project proposal also briefly describes the prevailing and future expected conditions including also biophysical and socio-economic conditions, environmentally sensitive areas of unique or special value, scientific institutions, socio-economic scenarios, and cultural heritage. It further ensures that the elements of the environment around will not be affected from the project activity at any stage during construction and regular operation. The proposal ensures that the present land use for the project activity is according to the Government policies.

Environmental, social, economic and other impacts associated with the project have also been described. Project activity related impacts on the local population including gender have been considered and conclusions drawn through relevant data that the project activity is neither going to add any adverse effects in general nor to leave any adverse environmental impacts on the population, water, air, soil, structures, wildlife, vegetation, biodiversity, historical buildings or else in the area.

The on site monitored environmental data (zero/ base line data) under "No Project Activity State" are also appended in this report as the ANNEXURES-IV to VII. The exhibited data show the state of the environment as it prevails as zero line record and its comparison at a later stage when the project goes to production.

Mitigation measures to be adopted during project operations to protect the environment in line with the NEQS --- ANNEXURE-VIII are given. A comprehensive Environmental Management Plan (E.M.P.) has been provided to ensure that environmental management is effectively practiced. Still further, Monitoring Plan (M.P.) and staff training requirements to manage the E.M.P. are also included in the report. The report takes into account the mitigation measures scheduled for E.M. implementation, fixing of responsibilities of various people in implementing the E.M.P.

Names of the team members who participated in collection of the data, monitoring of various parameters, laboratory testing, conducting surveys and carrying out other related activities and synthesis of the report are incorporated. List of the documents used in the preparation of the report has also been appended and references have also been incorporated.

The major impacts

Major impacts from the project activity, in case no environmental management measures are adopted, may appear. Likely impacts, under no remedial measures state, are summarily described below under the environmental, social and economic captions:

i- Environmental impacts

In case no remedial measures are adopted, the following environmental impacts may occur from the project activity:

Effluent:

From the potable water production unit about 13.3 % intake sea water will be harness for drinking purposes while the rest will be redischarge into the sea without any addition of pollutant. Similarly, from the power plant sea water at the rate of 308 kg/sec will be taken for cooling the system in a closed circuit and will be returned to the sea without tempering with its quality.

Emissions:

Since natural gas is the fuel, therefore, emissions of Sulphur dioxide (SO₂) and Particulate Matter will not take place.

However, Nitrogen oxides (NO_x) can become a source of environmental pollution in case no environmental management measures are adopted. Adequate mitigation measures, as described in the later part of this report, will be adopted to curtail its emissions

within the limiting values of the National Environment Quality Standards (NEQS).

Noise Levels:

Noise levels will be kept within the prescribed limits of the NEQS while taking care of this environmental aspect at the designing and fabrication stages of the plants. Proper repair and timely replacement of spares will further ensure that the noise levels remain within the NEQS prescribed limits. In addition to all this, proper mitigation measures, like construction of boundary walls will further minimize the noise levels outside the plant battery limits. Noise levels will also be reduced through installation of sound reducing equipments at proper places in the covered area of the plant if so desired.

More details of mitigation measures are described in the following sections of this EIA report.

ii- Economic impacts

While using local natural gas the plant activity will directly result in saving billions of Rupees to be spent in case imported furnace oil was to be used for the production of electricity. Provision of safe drinking water through this project activity, to a large cross section of the residents of Karachi, will result in saving colossal money through providing safeguards against water borne diseases which otherwise could result in huge expenditures to combat them.

During construction phase, job opportunities to about 1200 persons will be available. During regular operations of the plant about 60 people will be employed. In other words, if a family unit of 6 members is taken into account then 7200 and 360 people will be economically benefited from the plant activity during construction and regular operations phases respectively.

Provision of the two basic amenities of life i.e. electricity and quality drinking water will go a long way down the line in the improvement of the life style of the people. The social and economic costs of this factor could be well imagined.

Recommendations for mitigation and compensation

Mitigation measures against environmental pollution are ensured through adequate measures to be adopted rather these are incorporated into designing of the plant.

Mitigation measures to be adopted have been recommended. The mitigation measures are to be put in place through their incorporation at the project planning and designing stage. The project planning has already taken into account these factors as inbuilt measures to:

- i- install low NO_x burners to minimize the emissions of NO_x,
- ii- since natural gas is the fuel to run the plant hence there is no question of emissions of SO₂ or Particulate Matter,
- iii- noise levels will be kept within limiting values of the National Environment Quality Standards (NEQS) through proper and adequate repair and maintenance of the machinery and construction of boundary walls around the plant to act as excellent effective against noise levels,
- iv- there will not be any effluent discharge from any of the two plants because in power plant the sea water will be used in the closed circuit for cooling only and in the potable water production a gross of around 13.3 % sea water will be retained while the rest will be discharged to the sea without addition of any pollutant what so ever.

The plant manufacturers and suppliers have designed the plant on the basis of 30°C ambient, 100% load and consequently will virtually be zero blow down. Therefore, there will not be any effluent from this activity.

Proposed monitoring

A monitoring program has been recommended under the Environmental Management Plan (E.M.P.) Serial # 7.0. This E.M.P. is in accordance with the "Self-Monitoring and Reporting (SMART):" **ANNEXURE--IX** of the Environmental Protection Agency-Pakistan, as approved by the Pakistan Environment Protection Council (PEPC). The operation of this E.M.P. ensures that the environmental management at the plant will go according to the desired limits as set by the NEQS, Pakistan.

As desired by SMART--**ANNEXURE-IX**, parameters like Carbon monoxide (CO), Nitrogen oxides (NO_x) and Particulates will be monitored and reported on monthly basis for normal plant conditions. However, annual environmental monitoring by a third party will further ensure compliance with the NEQS.

2.0 DESCRIPTION OF THE OBJECTIVES OF PROPOSAL.

The proposal aims at describing and ensuring through detailed accounts that the project activity will not adversely affect in the project area any segment of the environment from human health to environmental settings around including like population, water, air, soil, structures, wildlife, vegetation, biodiversity, historical buildings etc.

The project proposal describes as how the project will fulfill two vital needs of providing quality drinking water (3MIGPD) and electricity (94 MW). It further explains that the provision of quality drinking water ensures the best safeguard against water borne diseases which take heavy toll of human life and require a lot of expenditure both by individuals and the Government to combat such diseases so common in countries like Pakistan. A more detailed account of these diseases has been given in the preceding part of this report.

Karachi is also hard hit for supply of electricity. The project activity will help to fulfill a sizeable and vital demand for electricity thus bringing relief to the citizens of Karachi. Provision of jobs during construction and operation phases will directly add to the economic benefits of the people those to work in the project activities.

Natural gas is to be used as fuel. Hence the proposal also describes savings of foreign exchange those were to occur in case the project was to run on imported furnace oil.

This EIA report describes details of the project activity from raw materials to the ultimate production of power and the potable water. It takes stock of all sorts of wastes to be generated during construction and while in regular production.. It provides solutions and measures to be adopted to ensure that the environmental health and health of the population around are protected. The existing environmental setting around the project site including biodiversity, socio-economic pattern of life existing in the project area are also described.

The major elements of the EIA report include:

- i- Executive or non-technical summary (title and location of the project, name of the proponent, name of the organization preparing the environment report, brief outline of the report, major impacts, recommendations for mitigation and compensation and proposed monitoring),
- ii- Description of the objectives of the proposal,

- iii- Description of the proposal and its alternatives (status of the proposal in the project cycle, description of planning, design and implementation stages, requirements for raw materials, water, energy and equipment),
- iv- Discussion of the proposal and current land use and policies (current land use controls in the context of the Government policies),
- v- Description of existing and expected conditions (boundaries adopted to study various aspects of the study),
- vi- Evaluation of the impacts and their mitigation (assessment of any impact on the local population, relevant environmental data, gaps in knowledge, compliance with relevant environmental standards, assessed significance of the impacts, possible measures for avoiding or mitigation the impacts)
- vii- Environmental management plan, monitoring plan and proposed training (description of the actions, schedule for implementation, assigning responsibility for implementation, monitoring program to assess performance, reporting and reviewing procedures and outline of training needs).

For further details reference be made to the respective sections of this report.

3.0 DESCRIPTION OF THE PROPOSAL AND ITS ALTERNATIVES

3.1 The status of the proposal in the project cycle (Pre-feasibility, feasibility or detailed design)

The proposal is the part of pre-feasibility in the entire project cycle.

3.2 Description of the planning, design and implementation stages

3.2.1 Planning

Conceptual level study about the project has been completed. Contracts for the provision of power generation plant and drinking water production/purification plant have been negotiated and contracts signed. Contract for the supply of natural gas has been concluded with ECC. Procurement of loans for the project are in the final stage of negotiations. Plants designing is under discussion of the plant and technology suppliers i.e. SIEMENS and Alfa Laval.

Land for the project siting has been procured.

Feasibility study incorporates into it the desired details of financial and technical aspects of the project along with other necessary issues in totality. The feasibility report concludes financial and technical viability of project, while ensuring environmentally sustainable operation of the plant at all stages of production.

In order to be in compliance with the relevant legal requirements of Pakistan, necessary measures and steps are being taken. And this EIA report forms an important first step of the requirements. Due details regarding various aspects of the project activity are being worked out at financial managers and technical expertise levels. M/S Siemens of Germany and Alfa Laval who will transfer technology, design and supply plants for this project are already in contact with their Pakistani counterparts.

3.2.2 Design

Base line data on all the required aspects of the plant have been worked out and the same communicated to M/S Siemens and Alfa Laval for carrying out preliminary designing of the plant. Detailed engineering of the plant will be carried out after approval of the preliminary design both by the local and the foreign expertise.

By this time, necessary background homework, regarding various aspects of the project is going on and project specific information is being gathered/generated to boost the speed of the project activity. The data on environmental aspects has been generated. Technical issues, engineering side, financial angles etc will be tailored, if so required, to suit the requirements of the plant design and other technical requirements.

3.2.3 Implementation

The implementation stages of the project activity include:

Stage I

- i- gathering of background information on all the aspects of the project and
- ii- procurement of design and process data.

Stage II

The following activities will also be initiated concurrently:

- i- civil work construction designing,
- ii- electrical work designing,
- iii- mechanical work designing,
- iv- detailed engineering of all the relevant parts of the plant.

Stage III

The following work along with the above activities will also be carried out concurrently:

- i- civil work,
- ii- construction of the plant ,
- iii- construction of the basic infra structures including roads, water supply system, electricity supply infra structure etc;
- iv- construction , pathways etc. within the plant battery limits
- v- installation of the plant.
- vi- trial production to ensure smooth functioning of the plant as a whole,
- vii- final hour modifications, changes, additions , deletions in the over all system of the plant and associated back ground facilities, and
- viii- commissioning of the plant on full scale.

3.3 The requirements for raw materials, water, energy and equipment

3.3.1 Raw materials

Major raw materials for the two products i.e. electricity generation and drinking water production are natural gas, air and raw water. The requirements of these main raw materials are indicated under the respective headings in this section:

3.3.2 Water

For all project activities water from the Arabian Sea will be taken. For potable water, sea water at the rate of 2861.0 tons per hour will be taken as input and out of this 2571.8 tons per hour will be discharged to the sea.

For power plant, water as coolant at the rate of 308.0 Kg/sec will be taken from the sea and after passing through close circuit be discharged to the sea.

3.3.3 Energy

The power generation plant will require natural gas at the rate of 4.413 Kg/sec and air at the rate of 178.022 Kg/sec the power generation plant will consume energy from its own production.

The potable water production unit will fulfill its energy need of 0.399 MW from sister self generation power plant.

3.3.4 Equipment

M/S Siemens-AG Power Generation, Germany will supply equipment for power generation and M/S Alfa Laval Copenhagen will provide technical know how and equipment for the production of potable water. List of the (major) plant equipments is attached as ANNEXURE-X.

3.4 The planned operational characteristics-hours of operation, processes, Products.

3.4.1 Hours of operation

The plant will operate 365 days yearly round the clock.

3.4.2 Process

Process flow sheet of both the power plant and the potable water manufacturing unit are exhibited in the ANNEXURE-XI and XII.

3.4.3 Products

Power of the order of 94MW and 3MIGPD potable water will be the final products.

3.5 Visual aids (maps of the area, site and plant layout, flow charts of production, and photographs of the site and similar projects)

3.5.1 Location map

The location map is attached as the ANNEXURE-I.

3.5.2 Plant layout

The plant layout is attached as the ANNEXURE-XI and XII.

3.5.3 Flow chart/sheet of production process

Flow chart/sheet of production of power and potable water are enclosed as the ANNEXURE-XI and XII.

3.6 Comparison of proposal options (size, siting, technology, Layout, energy, sources, sources of raw material):

3.6.1 Size

Keeping in view project economic viability, availability of project basic support systems, investment limitations, ensured availability of raw materials, end uses of the two products and environmental management considerations; sizes of the two plants production capacities of 94MW power and 3 MIGPD have been adopted.

3.6.2 Siting

Karachi is hard hit for power and potable water. Both the Government of Pakistan and the Government of Sindh are exerting hard to provide these basic necessities of life to the citizens of Karachi. In order to fulfill these demands a colossal investment is required which Government sector alone cannot afford to invest due to financial constraints. In this context, this private venture is to supplement Government efforts to fulfill the vital gap between the demand and supply of potable water and power. Even otherwise, from commercial point of view these two products have big market in the city of Karachi. So from demand and commercial point of views the project siting in Karachi is highly justified and ideally suited.

3.6.3 Technology

M/S Siemens -AG-Power Generation and Alfa Laval Copenhagen A/S are to provide technology for power generation and potable water production respectively. Both the technologies are according to the latest state of the art in the world.

3.6.4. Layout

In view of the considerations for availability of process water; Safety, Health, Environment (SHE); economic factors and operational requirements besides special considerations for Hazardousness and Operability (HAZOP) the present lay out has been finalized. As described earlier plant layout is shown in the ANNEXURE-XI and XII.

3.6.5 Energy sources

The entire requirement of energy to run both the units will be met from self generation.

3.6.6 Sources of raw material

Among the major raw materials include natural gas and water. While the ECC is to provide gas, water will be taken from the Arabian Sea which is hardly 50 meter away from the plant boundary line.

3.7 Summary of the technical, economic and environmental features of the proposal

This proposal describes in due details various aspects of the project including technical, economical and environmental features. A brief resume of each one of these is given hereunder.

3.7.1 Technical

Power generation is based on co-generation principle which provides cost reduction of per unit electricity to be produced. The surplus heat from the power plant will be used to desalinate water to make it worth drinking at acceptable price. Necessary details of the processes are given under serial 3.4.2.

Latest status of various aspects of project related technical activities is also described under serial 3.2.3. Necessary details of relevant technical features are given at respective parts in this proposal. For details reference may be made to the appropriate sections of this proposal.

3.7.2 Economic

The total cost of the project stands at US\$ 106.0 million.

3.7.3 Environmental

This proposal takes detailed stock of the (likely) potential environmental impacts from the project activity and describes necessary mitigation measures to be adopted to minimize their adverse effects. For details reference be made to the appropriate sections of this report especially the Environmental Management Plan, Monitoring Plan and Proposed Training at serial #7.0.

Environmentally sensitive areas of special or unique value including biodiversity, scientific, cultural, visual, historical buildings and heritage have also been described under serial #5.0 The proposal also takes into account the inbuilt stringent mechanism incorporated in the designing of the plant in order to run the plant in an environmentally safe fashion.

4.0 Discussion of proposal and current land use and policies

4.1 Land use

The project site is situated in the sandy and arid zone. While on the North side is sandy land and is the property of the Pakistan Defence Officers Housing Authority (P.D.O.H.A.), Phase-VIII, Karachi; the North/South side is surrounded by the Arabian Sea.

Government policies for land use do not restrict to go for industrialization of the area. The land has been allotted for the project by the P.D.O.H.A.; Karachi especially.

4.2 Regulatory framework

Of the salient features of Government policies for facilitating investment in Pakistan some are described as under:

4.2.1 Deregulation of the economy

Deregulation is the policy of the Government of Pakistan. Under this policy, deregulation of the economy and privatization of the state owned companies is going on.

4.2.2 Import policy

Import policy has been liberalized to a great extent through giving various incentives. There is an increased reliance on

development of the industrial sector and enhancement of international trade.

4.2.3 Infrastructure facilities

Infrastructure facilities such as road network, water and power supply, means of transportation and communications etc. are being improved speedily to facilitate investment for industrial growth.

4.2.4 Incentives

To keep Pakistan competitive in international markets and support the viability of investments in the country, the following incentives are available to both foreign and local investors:

- a- initial depreciation allowance (IDA),
- b- amortization and
- c- normal tax rates.

5.0 DESCRIPTION OF EXISTING AND EXPECTED CONDITIONS

5.1 Spatial and temporal boundaries adopted for the various aspects of the study

While taking stock of the existing and expected conditions natural environmental settings as they exist and industrial status in and around the project site covering a fairly large distance combined with likelihood of future industrial growth in the area have been taken into consideration. Special consideration has also been made to the demand and supply status of the two products i.e. power and potable water to the residents of the P.D.O.H. Authority, Karachi who are the direct beneficiary of the project.

5.2 Existing (baseline) condition of the biophysical and socio-economic environment, trends and anticipated future environmental conditions should the project not go ahead

The land on the North/West side of the project area is sandy dunes with very small bushes here and there. This area forms Phase-VIII of the P.D.O.H Authority, Karachi which is going to utilize both the power and the potable water from the project activity. On the South/ East side of the project site is the Arabian Sea.

The project site is about 5Km from the Village Restaurant and 10Km from China Chouk on the Sea View Road/Khayaban-e- Ittehad and 4 Km on the North/Eastside from the Defence Authority Golf Club.

There are no mangroves or any other delicate/sensitive ecosystems in the vicinity of the project site.

From environment point of view the area is virtually free from any pollution. This reality is also proved by the Zero Line Environmental Data collected and reported in the ANNEXURE-IV to VII. As such the available carrying capacity of the environment in the area is not yet utilized.

The project activity under the proposed strict environmental management controls in action is not going to affect the environment adversely. Implementation of the proposed Environmental Management Plan further guarantees protection of the environment around. This is further substantiated that all the pollutants handling will be done to comply with the NEQS limiting values.

Should the project not go ahead, there will not be any change in the existing status of the environment i.e. under Business As Usual Condition (BAU). As also described in the preceding para, since the required E.M.P. is to be put in place, therefore in the case of the project activity there will not be any adverse effects on the environment either. Instead, the project will provide to the residents of the P.D.O.H. Authority two vitally important needs i.e. power and quality potable water.

5.3

Environmentally sensitive areas of special or unique value

(Physical resources of the project area: Topography and geology, Soils and Climate; water, **Ecological resources:** Fisheries and aquatic biology, Biodiversity, Forestry, Wildlife scientific institutions, Socio-economic, Cultural and other heritage)

5.3.1 Physical resources of the project area

Physical resources of the project area are highlighted as below.

5.3.1.1 Topography and geology

As also described in the earlier part of this report, from the East to the West side of the project site runs the Arabian Sea and on the North is open sandy land with some small bushes.

There is neither any creek or estuary whatsoever in the vicinity of the project site.

5.3.1.2 Soils

As described above on two sides of the project site is sea while on the other side is open sandy land with some very small bushes.

5.3.1.3 Climate

Sea breeze dominates the climate of Karachi. Daily temperature range is kept low due to maritime influence. The influence of sea is felt mainly through out the prevailing winds. Humidity level is moderately high exceeding more than 50% from April to September. Mean monthly temperature is 32^o C while May - June and October are the hottest months. Dry winds from South-eastern desert dominate the climate during October. Rainfall is scanty throughout the year. From Karachi up to Rann of Kutch, the coast experiences most of its rainfall during the monsoon season.

5.3.1.4 Water

Availability of quality water for drinking is an acute problem in the whole of Karachi. Underground water is brackish. Hub Dam is the major source of potable water supply to the city.

The project need for water will be fulfilled from the sea water both for turbines to produce electricity and quality potable water. The sea water will be processed at the plant for which M/S Alfa Laval is to provide technology and plant.

5.3.2 Ecological resource

5.3.2.1 Fisheries and aquatic biology

Arabian sea is the biggest water body near the project site. The sea hosts a vast variety of fisheries and aquatic biology.

Mangroves, the breeding grounds for fish and shrimps, are found in the distributaries of the Indus delta. Mangroves in the areas of Manura and southern coast of Korangi are worth mentioning. There are no mangroves in the vicinity of the project site.

The Sindh coast accounts for 70% of the total marine catch although it constitutes only 30% of Pakistan's coast line (130 km). The Sindh coast has the advantage of wider continental shelf with added advantage of its being fed by the Indus River, which brings with it sufficient quantity of fish food.

Summarily, of the most important marine life in the coastal waters of Karachi and around include fish, prawns, crabs, shrimps, and lobster. Turtles are yet the other segment of the marine life.

5.3.2.2 Biodiversity

Natural capital of a country mainly includes all of a country's wilderness areas and scenic landscapes, including also with their associated flora and fauna.

Pakistan has a total of nine major ecological zones. The contribution of the "Natural capital" is recognized at three distinct levels: species, genera, and communities (habitat and ecosystem). Both collectively and within each level, the range or variety of the resources is referred to as the "Biological Diversity". The term has relevance for each of Pakistan's administrative units—district, province, and particularly country. The more the number of species, genera, and habitats and ecosystems present within these units, the greater is said to be the Biodiversity. The biodiversity of the area, with this background, is discussed as under:

5.3.2.2.1 Forestry

As mentioned in the earlier parts of this report, the site is situated in between sandy land on the North side and sea on the East-West side. Hence there is no question of any sort of forest around.

5.3.2.2.2 Wildlife

There is neither any forest nor any habitat for wild life, therefore, there is no mention of any worth mentioning wild life around. However, some rats and lizards are found in extremely small numbers.

5.3.2.3 Scientific institutions

There are no worth mentioning scientific institutions in the vicinity of the project site.

5.3.2.4 Socio-economic, cultural and other heritage

Sandy dunes and sea are encircling the project site which falls in the Phase-VIII, unbuilt area of the P.D.O.H. Authority. There is no heritage in the context of socio-economic, cultural or other type.

5.4 Existing socio- economic conditions

The project site is situated at the outskirts of the city of Karachi which has a vast variation regarding socio-economic conditions. If there is very high affluent society, there is more than 40% population below the poverty line. Even a fairly large number of the people are forced to sleep on foot paths or at other open places.

The number of jobless people is colossal. Begging, like other big cities of Pakistan, is on the rampage. Education and medical facilities are out of the reach of a vast number of the people because of poverty.

Basic necessities of life including for example provision of electricity, water, communication, infra structure, transport etc. lack much behind the requirement.

More details are given as under:

5.4.1 Population and communities

According to the fifth census, the population of Karachi stands at 9.269 million which might have since then swelled to around 10.0 million by this time. Some small villages are situated around the city also.

Communities of diverse nature in social, economic, cultural etc style/values form the part of this population of the city. People from every walk and every part of the country are found. Karachi is a cosmopolitan city.

5.4.2 Industries

Karachi is the Economic Capital of Pakistan. More than 70.0% of the industry is sited here. Multinationals also prefer to install industry in Karachi with the big criteria of its being a sea port.

Both organized and unorganized sector industries are operating in the city. Among the biggest industrial sites include SITE, KITE and Port Qasim area besides many other small industrial sites. People from all over Pakistan have invested in these industries.

Karachi is a cosmopolitan city where people from all over the country and all walks of life, right from a worker to an industrialist, are residing in it.

5.4.3 Cultural and aesthetic values

As explained earlier, Karachi is a cosmopolitan city. People with a large diversity in the cultural and aesthetic values are residing. People with life style of those of Europeans, USA or any other developed country to that of the poorest areas of Pakistan are available in the city. There is a blend of urban and rural society.

Where a large cross section of the people is highly qualified and rich, there illiteracy of acute nature and poverty also prevail among a large number of the residents. Even these factors also make a big difference in cultural and aesthetic values of the people. People from various parts of the country mostly stick to their ancestral and regional cultural and social values.

Purely old traditional village pattern of life typical of the common villages of Pakistan also dominates the life style in some areas. Most of the people follow quite old type of life styles and traditions. In contrast, a large number of the people live very modern life style of the West.

Economic status of the people also influences to follow different life styles.

Most of the people are illiterate but awareness and importance of education is attracting the people to send their wards to schools. Some modernization in the existing cultural values is appearing among those educated and economically well off and those frequently mixing with educated society.

6.0 EVALUATION OF IMPACTS AND MITIGATION MEASURES

Evaluation of impacts and mitigation measures are described below.

6.1 Assessment of any environmental impact on local population and the environment during construction and operational phase

A systematic account of the environmental issues, their likely impacts on the local population and the environment during construction and operation phases and their solutions are given hereunder.

6.1.1 During construction

The most probable environmental impacts to occur due to the project activity during construction phase are described as below:

6.1.1.1 Pollution impacts

Major sources of pollution during construction phase could be moving vehicles transporting construction and raw materials and plant machinery. Minor addition to the existing noise levels, dust/particulates and gaseous emissions from the auto exhausts will be dissipated by the unutilized vast carrying capacity of the ecosystems. Vehicles will be visiting the project site at different intervals of time. There will not be any stampedes of vehicles. This will further ensure that the environmental pollution does not adversely affect the people and the environment.

The nearest residential area is around 5Km from the project site on the road to the Village Restaurant. At such a distance the minor additions to the noise levels and gaseous emissions and particulates will not have any adverse impact on the population.

During civil works, mechanical operations/activities, installation and fitting of machinery and plant parts, and other construction or fabrication activities noise and dust could be the pollutants. The levels of all sorts of pollution will be negligible in the context of their impact on population and environment. Their magnitude will not increase to the level of being nuisance because these activities will be at very low profile. Even further, their level will be diluted by the unutilized carrying capacity of the environment around the plant site.

6.1.1.2 Tree cutting

The land around the project site is sandy. There are no trees in or around the project site. Therefore, there is no question of cutting of trees during construction or operational phase of the project.

6.1.2 During operation stage

During operation stage of the plant, environment management order shall be enforced according to the details given in the Environmental Management Plan and following environmentally sustainable practices. For further details refer to serial # 6.4 and section # 7.

Thus protection of human health and all other segments of environment is safeguarded both during construction and operational phases.

The Environment Management Plan provides safeguards against any likely adverse environmental impacts from the project operation. For more details refer to Mitigation Measures (serial # 6.4) and the Environmental Management Plan, Monitoring Plan and proposed training section (section # 7) of this EIA report.

6.2 Potential socio-economic impacts

During construction phase about 1200 people will get jobs. With a family size of 6, some 7200 humans will get their livelihood. Similarly, during regular operational phase around 60 people will be absorbed. According to the same calculation 360 human beings will earn livelihood.

Thus the project activity will become a source of earning and raise living standard of those to work in the project operation which indirectly prompts a cross section of the people to send their children to school and improvement in their social status.

6.3 The relevant environmental data and predictive methods used and any underlying assumptions made

6.3.1 Base line environmental data

Primary baseline project site-specific environment data were monitored between September 30 to October 2, 2004 by site visit under "No Activity State".

Environmental data was collected through actual on site monitoring for ambient air quality including gaseous and particulate matter, noise levels and through laboratory testing of water sample from the sea. There is no other source of surface or ground water on or near the project site.

Required details of monitoring are reported as under. While, background details are summarized hereunder, the monitored data are reported in the relevant ANNEXURES-IV to VII.

6.3.1.1 Ambient Air Quality

Gaseous pollutants and particulates were monitored on the project site. Details of the monitoring and the site specific environmental data generated are given under respective headings as below.

6.3.1.1.1 Gaseous

For zero/base line (primary) data, Ambient Air Quality monitoring was carried out at thirteen points on and around the project site. The equipment, used during ambient monitoring to generate background/ baseline data, is made by DRAGER, Germany. The monitored parameters include Sulphur dioxide (SO₂), Nitrogen oxides (NO_x--NO and NO₂) and Carbon monoxide (CO). The monitored results are given in the ANNEXURE-IV.

6.3.1.1.2 Particulate Matter

Particulate matter monitoring was carried out at five monitoring locations. Iso-Kinetic the Casella System (Instrument) designed to comply with BS 3405 and ISO-9096 for compliance monitoring of particulate matter was used for this monitoring. The base line/background data generated are exhibited in the ANNEXURE-V.

6.3.1.1.3 Noise Levels

Noise levels monitoring in the area around project site was carried out at thirteen locations for existing noise levels using LEADER Sound Level Meter, Japan. The results are reported in the ANNEXURE-VI.

6.3.1.1.4 Water Quality

There is no other source of water on and around the project site except the sea. Therefore, water sample from the sea was taken. The detailed analysis of the sample is presented in the ANNEXURE-VII.

6.3.2 Gaps in knowledge and uncertainties encountered

The required information virtually on all desired elements of the EIA report was available on investigation. As such no specific uncertainty was encountered.

6.4 Compliance with relevant environmental standards

6.4.1 Effluents

About 13.3% of the sea water will be retain for potable water production while the rest of it will be discharged to the sea without addition of any external pollutant to any extent. Therefore, from this activity no effluent will be generated.

The power plant has been designed with virtually zero blow down. Therefore, from this part of the activity there will not be any effluent. On the other hand, the sea water will be used in the close cooling circuit and the coolant water after passing through the circuit will be discharged to the sea without addition of any pollutant. As such there will not be any effluent from this step also.

6.4.2 Emissions

6.4.2.1 Gaseous

Since natural gas is the fuel, therefore, no emissions of SO_2 will take place. Achieving full possible efficiency of fuel (gas) burning emissions of CO will also remain within the limiting values of the NEQS.

Use of low NO_x burners associated with oxygen normalization and efficient combustion controls will keep the emissions of NO_x within the limits of the NEQS.

6.4.2.2 Particulate matter

Natural gas being the fuel hence there is no question of emissions of particulate matter. The factor that can

contribute to the emission of particulate matter is the combustion air. In this case highly efficient air filters of quality are to be used. Therefore, if at all there is emission of P.M. it will be of extremely low order and that too is to remain too below the NEQS limiting value.

6.4.2.3 Noise Levels

The designing of the plant has been done on the basis of minimization of not only noise but also the other environmental pollution parameters.

Noise levels within plant will be kept in compliance with the NEQS required limits by proper repair and maintenance of the equipment/machinery. Timely replacements of parts of machinery and equipment will be ensured in order to avoid excessive sound levels during plant operational condition.

Noise levels at plant boundary walls will be in compliance with the NEQS limiting values. Boundary walls of the plant also act as excellent buffer against high noise levels. Thus, public in near by areas will not be effected by noise levels.

Noise levels within specific plant sites may marginally exceed the limiting values prescribed by the NEQS. The workforce to work in these areas will be provided ear muffs/plugs as the case may be, in order to avoid exposures to excessive noise levels.

6.5 Assessed significance of the impact stating the standards or criteria used as a basis for judgment

All possible environmental impacts and their solutions are duly reported at serial # 6.4 above besides in other relevant parts of this proposal. Necessary data as desired have also been reported. The impacts have been assessed against the National Environment Quality Standards, Pakistan.

Estimated amounts of gaseous emissions are as below. The benchmark data reported here were calculated based on the practical measurements of such gases in many similar other cases of various industries.

Estimated amounts of gaseous emissions

Reference	Sulphur dioxide (SO ₂) Ppm	Nitrogen oxides [NO _x (NO+NO ₂)] ppm	Carbon monoxide (CO) ppm	Particulate matter (P.M.) mg/Nm ³
Stack	Zero	34 maximum	31 maximum	0.2 maximum

6.6 Possible measures for avoiding or mitigation the impact

Cleaner production helps to reduce pollution. It also helps to minimize resources in puts ultimately cutting upon wastes quantities and production cost reduction. For more details reference be made to the serial # 6.4 above.

6.6.1 Wastewater

Refer to the serial # 6.4

6.6.2 Emissions --gaseous and particulate matter

Refer to the serial # 6.4

Nitrogen Oxides-NO_x:

Refer to the serial # 6.4

Sulphur Dioxide-SO₂:

Refer to the serial # 6.4

Carbon Monoxide-CO:

Refer to the serial # 6.4

6.6.3 Particulate Matter:

Refer to the serial # 6.4

6.6.4 Noise Levels

Refer to the serial # 6.4

6.6.5 Solid wastes

Solid wastes will include empty steel and plastic drums of chemicals. These will be returned to their supplier for recycling at their end. Wooden packings of heavy and light machinery and parts, steel wires, redundant electric wires and strips will be sold in the market. Used fluorescent electric tubes and bulbs will either be land filled in scientific landfill or sold to small scale glass melting and manufacturers. Used electric fans and water coolers will also be sold out in the markets. Used auto parts, machine parts and used office furniture will also be sold in the market

Miscellaneous solid wastes like used tyres, tubes, batteries, belts, nylon strips, filters, scrap wood, steel scrap, air filters, household articles, etc. will also be sold to contractor.

While disposing any waste material, all the environmental aspects/ impacts of the waste (if any) will be communicated to the concerned contractor.

On the over all basis an adequate environmental management plan is going to be put in place and to be kept operational. This will further ensure environmental compliance with the NEQS of all wastes.

7.0 ENVIRONMENTAL MANAGEMENT PLAN, MONITORING PLAN AND PROPOSED TRAINING

According to EIA guidelines matrices as followed in the preparation of this proposal, this part takes into account the followings:

- i- description of the proposed mitigation actions,
- ii- schedule for mitigation,
- iii- assigning responsibility for implementation (by name or position) ,
- iv- monitoring program to assess performance,
- v- reporting and reviewing procedures, and
- vi- training needs.

7.1 Description of the proposed mitigation actions

A summary of the mitigation measures/actions to be adopted against all possible type of pollutants to be generated from the project operation is given hereunder. For more details reference be made to serial # 6.0.

7.1.1 Effluents

Reference be made to the serial # 6.4

7.1.2 Gaseous emissions and particulate matter

Reference be made to the serial # 6.4

7.1.3 Noise levels

Reference be made to the serial # 6.4

7.1.4 Solid wastes

Reference be made to the serial # 6.6.5

7.2 Schedule for mitigation

Adequate mitigation measures are to be adopted to cut down the quantity of wastes. These are incorporated in the designing of the plant in order to run the plants in an environmentally sustainable fashion and in compliance with the NEQS-Pakistan. For details reference be made to serial # 6.0

7.3 Assigning responsibility for implementation (by name or position)

For effective environment management, responsibilities are set for each operation as follows:

Official concerned	Responsibility
1- General /plant Manager (works)	i- Over all in-charge of all the environmental management (E.M.) set up. ii- He will be responsible to ensure smooth functioning of the E.M. system iii- Daily progress on the state of the environmental status will be reported to him in writing. iv- All other E.M. matters, issues and problems will be reported to him for rectification. v- He will work as bridge between the Government concerned authorities and the inside E.M. vi- He will be answerable to the higher management in all matters relating to E.M.
2- Shift Engineer	i- During his shift timings, he will be responsible to look into smooth functioning of the process in environmentally sustainable fashion. ii- He will be responsible to rectify any problem regarding environmental matter. iii- He will directly report all matters of E.M. to the G.M.
3- Plant Operator	i- He will record emissions behaviour on hourly basis and will report to the Shift Engineer.
4- Laboratory Chemist	i- He will be responsible to carry out all tests regarding environmental monitoring which includes Gaseous emissions monitoring, particulates monitoring, sound levels monitoring etc. according to the monitoring scheduled described below in section 7.4, and will report to the concerned Manager

7.4 Monitoring program to assess performance:

According to the "Guidelines for Self-Monitoring and Reporting by the Industry," Final Report, March 1998, approved by Pakistan Environmental Protection Council (PEPC), in August 1999 ANNEXURE-IX, the Power Plants (gas fired) fall under "Category B" regarding monitoring of gaseous emissions.

Under such conditions Carbon monoxide (CO) and Nitrogen oxides (NOx) are to be monitored and reported on quarterly basis for normal plant conditions.

As regards effluents they are to be monitored on quarterly basis for the parameters including effluent flow, temperature, pH, TSS and oil and grease.

7.5 Reporting and reviewing procedures

Monitoring schedule, as explained at serial # 7.4, will be adhered to and all the data to be monitored will be scrutinized at the level of Shift Engineer and on quarterly basis at the G.M. level. The data will be documented according to appropriate format. Discrepancies will be duly addressed to. For presentation of the data to the Government Agencies, approved data recording format --- ANNEXURE-IX will be used.

7.6 Training needs

Environment Management staff at the plant will be trained especially in the following fields:

7.6.1 Environmental Monitoring

It is necessary to train the relevant plant staff for gaseous emissions, effluents and sound levels monitoring in order to report the monitored data on quarterly basis for assessment of smooth functioning of the plant. Third party monitoring of all the required environmental monitoring will be carried out twice yearly. This will ascertain the status of environmental management to be carried out at the plant.

7.6.2 Environment quality control laboratory

7.6.2.1 Gaseous monitoring:

Although for the emissions monitoring online analyzer will be installed on stack, but it is also needed to have portable flue gas analyzer and sound levels meter in plant quality control laboratory.

7.6.2.2 Effluent testing laboratory:

Among the main Laboratory Equipment/ Instruments required to carry out environmental monitoring include:

Equipment and instrumentation

- i. Spectrophotometer
- ii. COD Reactor
- iii. BOD Reactor
- iv. pH meter mobile
- v. Dissolved Oxygen Meter
- vi. Conductivity Meter mobile
- vii. Incubator 26^o C
- viii. Mobile Weather Station
- ix. Oven (Temperature Control)
- x. Glass apparatus - Volumetric A grade
- xi. Chemicals A.R. grade
- xii. Water distillation unit all Pyrex
- xiii. Analytical balance

8.0 REFERENCES

The following documents, reports were consulted during the preparation of this report.

- i. Feasibility Report-DHA- Cogen Ltd;
- ii. Guidelines for the preparation and review of Environmental Reports, Pakistan Environmental Protection Agency, Government of Pakistan, October, 1997.
- iii. Introduction to Environmental Impact Assessment; J. Glasson, R. Therivel and A. Chadwick, UCL Press Limited, University College, London.
- iv. Environmental Guidelines for Selected Industrial Projects, Office of the Environment, Asian Development Bank, 1993.
- v. Guidelines for Self- Monitoring and Reporting by the Industry," Final Report, March 1998, approved by Pakistan Environmental Protection Council (PEPC), August 1999.
- vi. Pollution Prevention and Abatement Handbook, The World Bank, 1998.
- vii. Shreve's Chemical Process Industries, McGraw-hill Book Company, N.York; 5th Edition, 1985.
- viii. Faith, Keyes and Clark's, Industrial Chemicals, A Willey Interscience Publication, N. York, 4th Edition, 1975.
- ix. Perry's Chemical Engineer's Handbook, McGraw-hill Book Company, N.York, 6th Edition, 1984.
- x. National Environment Quality Standards for Municipal and Liquid Industrial Effluents, Statutory Notification (S.R.O.), Government of Pakistan, Ministry of Environment, Local Government and Rural Development, S.R.O.549 (1)/2000, Islamabad, the 8th August 2000.
- xi. Pakistan Environmental Protection Act, 1997.
- xii. The Pakistan National Conservation Strategy, Environment and Urban Affairs' Division (presently- Ministry of Environment, Urban Affairs and Wild Life), Government of Pakistan, Islamabad.
- xiii. Standard Methods for the Examination of Water and Wastewater. 19th Edition, 1995, Prepared and published jointly by: American Public

Health Association, American Water Works Association, Water Environment Federation, Publication office: American Public Health Association, 1015 Fifteenth Street, NW Washington, DC 20005

- xiv. STANDARD HANDBOOK OF ENVIRONMENTAL ENGINEERING, BY Robert A. Corbitt, 1989, McGraw-HILL, INC.; New York, USA.
- xiv. PAKISTAN: GEOGRAPHY, ECONOMY & PEOPLE by Oxford Press Singapore.
- xv. The Environment of Pakistan, Huma Naz Setthi, Peak publishing, London U.K, 2003.
- xvi. Report on Hydrographic Survey, DHA Cogen, Karachi; January 2003.
- xvii. Siemens AG- Power Generation Department; PG 15, Reference No.: D-0582-01-0.
- xviii. Contract between DHA Cogen Ltd. (DCL) and Alfa Laval Copenhagen A/S for Supply of 3.0 MIGPD for Desalination Plant; January 2004.

9.0 SOURCES OF DATA AND INFORMATION AND LIST OF REFERENCE MATERIAL USED

The site specific data regarding ambient air quality (CO, SO_x, NO_x), Particulate Matter, sea water quality, and sound levels were generated through on site monitoring. The environment monitoring and laboratory testing of samples by M/S ECTECH- Environment Consultants was accomplished through their laboratory- APEX ENVIRONMENT LABORATORY (certified as Environment Laboratory, by the Environment Protection Department, Government of the Punjab). Additionally, the documents reported at the serial # 8 were also consulted.

10.0 TEAM MEMBERS WHO CARRIED OUT THE INDUSTRY AND PREPARED THE EIA

Team members who participated in various activities of this study and preparation of this report are listed hereunder with their qualifications, experience and assignment carried out by each one of them.

Name of the EIA team member	Qualification and brief experience	Position in the EIA Team and role*
<p>1-Dr. Muhammad Hanif, Chief Executive, ECTECH-Environment Consultants, and APEX Environment Laboratory;</p>	<p><u>A-Qualifications:</u></p> <p>1- M.Sc. (Chem. Tech.) Panjab Uni; Lahore; 1962. 2- Ph.D. (Chemistry) Charles University, Czech Republic; 1968. 3- Post Doctorate-Alex. Humboldt Foundation, Senior Post Doctorate Fellow, Germany; 1974-75.</p> <p><u>B-Experience/past Positions:</u></p> <p>1-Director General (R), PCSIR Labs. Complex, Lahore. 2-Director General (Ex.) Ministry of Environment, Local Government and Rural Development, Govt. of Pakistan. 3- (ex.) Consultant Environment, Category-A, Asian Development Bank. 4- (ex.) Consultant Environment, UN--ESCAP 5- Worked on World Bank Funded Project. 6- Author of the National Environment Quality Standards (NEQS) 7 Author of: i-104 Scientific Research papers ii- Over 60 technical and project reports on environment. 8- Carried out EIA and reviewed around 15 EIA reports. This also includes the EIA carried out on behalf of the Asian Development Bank regarding Kathmandu Valley (Nepal) Industrial Site, Saindak Gold/Copper Project, Pakistan Steel, Karachi and so on.</p>	<p>-Team Leader -Principal author of this report. -Over all monitoring of the study work, supervision, guidance and participation in all the activities to ensure quality of the work.</p>
<p>2-Muhammad Saif-ur-Rehman</p>	<p>B.Sc. (Chemical Engineering), Panjab Uni. -Special thesis was completed on Environmental Management Practices and Waste Water Treatment Technologies. This was a part of the B.Sc. Final Year degree requirement. M.Sc. (Applied Environmental Sciences), Panjab Uni. -General Manager, APEX Environment Lab. and</p> <p>-Chief Engineer Monitoring, ECTECH -Environment Consultants</p> <p><u>-Experience in Environment:</u> For the last over 10 years working in the field of environment on the following subjects:</p> <p>i- Prepared 6 EIAs, in the field of Power Generation, fertilizer and chemical industry. ii- Designing, fabrication, installation and operation of Waste Water Treatment Plants; So far three plants have been installed and four are in the process of designing.</p>	<p>-Senior Team Member -Project on site monitoring & related activities. - co-author of the report - Collection of demographic data. - Preparation of environmental management plan.</p>

	iii- Carrying out environmental Audit: Around 15 industrial units have been completed so far. iv- Lab. Testing of effluents and water: For the last 5 years lab. testing services have been provided by me.	
3- Muhammad Imran Waseem	M.Sc. (Chemistry), Panjab University, Lahore. - Senior Lab. Analyst, APEX Environment Laboratory - Senior Monitoring Engineer ECTECH-Environment Consultants	-On site monitoring and lab. testing of samples and data processing. - Report writing. -Preparation of environmental management plan
4- Saghir Hussain	M.Sc. (Chemistry), Quaid-e- Azam University, Islamabad - Lab. Analyst, APEX Environment Laboratory - Monitoring Engineer ECTECH-Environment Consultants	---DO---
5- Yasir Mahmood	M.Sc. (Environmental Sciences), Panjab University, Lahore. - Lab. Analyst APEX Environment Laboratory - Monitoring Engineer ECTECH-Environment Consultants	---DO---
6- Mahmood Ahmed	M. Phil. (Chemistry), Govt. College University, Lahore. - Lab. Analyst, APEX Environment Laboratory - Monitoring Engineer ECTECH-Environment Consultants	---DO---
7- Chaudhry Noor Ahmad	B.Sc. Civil, hydrological and Structural Engineering. (Karachi Uni.)	-Hydrological and agriculture studies.
8- Mr. Ather Azim Usmani	M.Sc. Sociology (Panjab University)	Demographic, socio-economic, heritage, cultural, and other relevant studies
9- Prof. Dr. Ikram-ul-Haque	M.Sc., Ph.D. Botany (Panjab University)	Biodiversity, agriculture practices and related studies.
10- Mr. Aftab Ahmad Cheema	M.Sc. Chem. Engineering (P.Uni.). Ex: Acting Chairman National Fertilizer Corporation; Managing Director, Pak Arab Fertilize Corporation, Multan; Plant Manager Dawood Hercules; Plant Manager Nestle	Process and production and waste treatment studies.
11- Mr. Muhammad Anis	B.A; L.L.B; Expert on Environment Law	Guidance on various aspects of Environmental Law as applicable to EIA and related context.

*Only the main roles of the team members are given. However, their role was not restricted to these, rather it also includes many other studies in their respective fields as required by the matrix of this proposal.

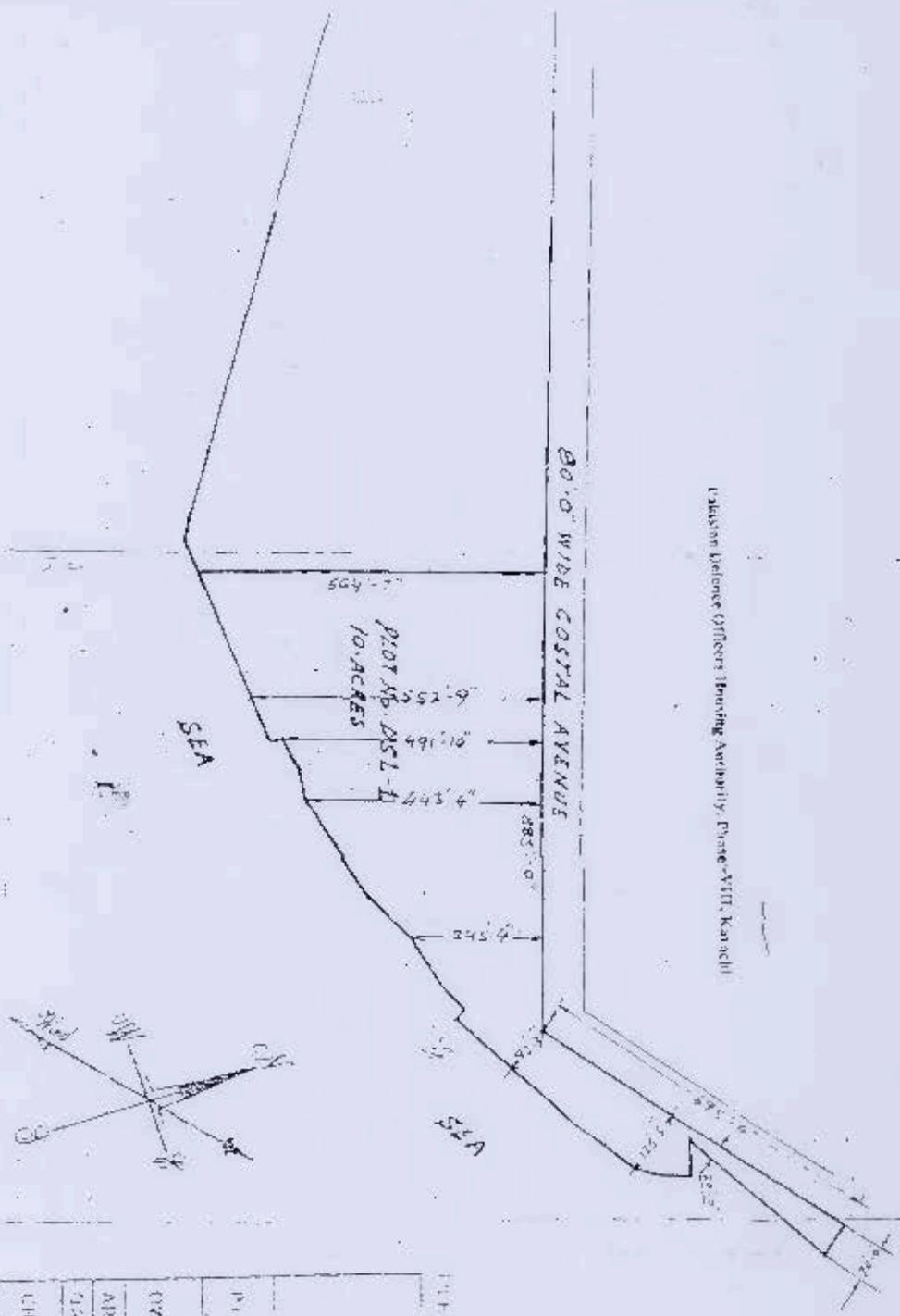
11.0 TERMS OF REFERENCES FOR THE ENVIRONMENT REPORT

Terms of references for the environmental report are attached at the ANNEXURE-III.

ANNEXURE-I
Plan Location Map

**SITE FOR COMBINED POWER
GENERATION AND DESALIN-
ATION PROJECT DHA**

Pakistan Defence Officers Housing Authority, Phase-VIII, Karachi



**REVISED
PROVISIONAL**

VALID FOR TWO YEARS ONLY

Pakistan Defence
Officers Housing Authority
KARACHI

PROJECT	NO. DSE-I COASTAL AVENUE PH = VIII
OWNER	P. D. O. H. AUTHORITY
AREA	10 ACRES
DRAWN	19/08/2004
CHECKED	19/08/2004
SCALE	NTS
DATE	19-08-2004

SPECIALARY DIRECTOR PLANNING

The Gazette of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABAD, SATURDAY,, DECEMBER 6,1997

PART I

Acts, Ordinances, President's Orders and Regulations

SENATE SECRETARIAT

Islamabad, the 6th December, 1997

No. F. 9(46)/97-Legis.- The following Acts of Majlis-e-Shoora (Parliament) received the assent of the Acting President on 3rd December, 1997 are hereby published for general information :-

ACT NO. XXXIV OF 1997

An Act to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development;

• WHEREAS it is expedient to provide for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution, promotion of sustainable development and for matters connected therewith and incidental thereto;

1. Short title, extent and commencement.---

- (1) This Act, shall be called the Pakistan Environmental Protection Act, 1997;
- (2) It extends to the whole of Pakistan.
- (3) It shall come into force at once.

2. Definitions.—In this Act, unless there is anything repugnant in the subject or context,—

(i) "adverse environmental effect" means impairment of, or damage to, the environment and includes—

- (a) impairment of, or damage to, human health and safety or to biodiversity or property;

(b) pollution; and

(c) any adverse environmental effect as may be specified in the regulations;

(ii) "agricultural waste" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry residues from the use of fertilizers, pesticides and other farm chemicals;

(iii) "air pollutant" means any substance that causes pollution of air and includes soot, smoke, dust particles, odour, light, electro-magnetic, radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;

(iv) "biodiversity" or "biological diversity" means the variability among living organisms from all sources, including inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, including diversity within species, between species and of ecosystems;

(v) "Council" means the Pakistan Environmental Protection Council established under section 3;

(vi) "discharge" includes spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping;

(vii) "ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit;

(viii) "effluent" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;

(ix) "emission standards" means the permissible standards established by the Federal Agency or a Provincial Agency for emission of air pollutants and noise and for discharge of effluent and waste;

(x) "environment" means—

(a) air, water and land;

(b) all layers of the atmosphere;

(c) all organic and inorganic matter and living organisms;

(d) the ecosystem and ecological relationships;

(e) buildings, structures, roads, facilities and works;

- (f) all social and economic conditions affecting community life; and
- (g) the inter-relationships between any of the factors specified in sub-clauses (a) to (f);
- (xi) "environmental impact assessment" means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed;
- (xii) "Environmental Magistrate" means the Magistrate of the First Class appointed under Section 24 ;
- (xiii) "Environmental Tribunal" means the Environmental Tribunal constituted under section 20 ;
- (xiv) "Exclusive Economic Zone" shall have the same meaning as in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);
- (xv) "factory" means any premises in which industrial activity is being undertaken;
- (xvi) "Federal Agency" means the Pakistan Environmental Protection Agency established under section 5, or any Government Agency, local council or local authority exercising the powers and functions of the Federal Agency;
- (xvii) "Government Agency" includes—
 - (a) a division, department, attached department, bureau, section, commission, board, office or unit of the Federal Government or a Provincial Government;
 - (b) a developmental or a local authority, company or corporation established or controlled by the Federal Government or Provincial Government; and
 - (c) a Provincial Environmental Protection Agency. ; and
 - (d) any other body defined and listed in the Rules of Business of the Federal Government or a Provincial Government.
- (xviii) "hazardous substance" means—
 - (a) a substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971 (II of 1971), which, by reason of its chemical activity or toxic, explosive, flammable, corrosive, radioactive or other characteristics, causes, or is likely to cause, directly or in combination with other matters an adverse environmental effect; and

- (b) any substance which may be prescribed as a hazardous substance;
- (xix) "hazardous waste" means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste and includes hospital waste and nuclear waste;
- (xx) "historic waters" means such limits of the waters adjacent to the land territory of Pakistan as may be specified by notification under section 7 of the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);
- (xxi) "hospital waste" includes waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics and laboratories;
- (xxii) "industrial activity" means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purpose;
- (xxiii) "industrial waste" means waste resulting from an industrial activity;
- (xxiv) "initial environmental examination" means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment;
- (xxv) "local authority" means any agency set up or designated by the Federal Government or a Provincial Government, by notification in the official Gazette, to be a local authority for the purposes of this Ordinance;
- (xxvi) "local council" means a local council constituted or established under a law relating to local government;
- (xxvii) "motor vehicle" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;
- (xxviii) "municipal waste" includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;
- (xxix) "National Environmental Quality Standards" means standards established by the Federal Agency under clause (e) of sub-section (1) of section 6 and approved by the Council under clause (c) of sub-section (1) of section 4;

(xxx) "noise" means the intensity, duration and character of sounds from all sources, and includes vibration;

(xxxii) "nuclear waste" means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive;

(xxxiii) "person" means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, company, corporation, co-operative society, Government Agency, non-governmental organization, community-based organization, village organization, local council or local authority and, in the case of a vessel, the master or other person having for the time being the charge or control of the vessel;

(xxxiv) "pollution" means the contamination of air, land or water by the discharge or emission of effluent or wastes or air pollutants or noise or other matter which either directly or indirectly or in combination with other discharges or substances alters unfavourably the chemical, physical, biological, radiational, thermal or radiological or aesthetic properties of the air, land or water or which may, or is likely to make the air, land or water unclean, noxious or impure or injurious, disagreeable or detrimental to the health, safety, welfare or property of persons or harmful to biodiversity;

(xxxv) "prescribed" means prescribed by rules made under this Act;

(xxxvi) "project" means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes—

- (a) construction or use of buildings or other works;
- (b) construction or use of roads or other transport systems;
- (c) construction or operation of factories or other installations;
- (d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like;
- (e) any change of land use or water use; and
- (f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations;

(xxxvii) "proponent" means the person who proposes or intends to undertake a project;

(xxxviii) "Provincial Agency" means a Provincial Environmental Protection Agency established under section 8;

(xxxix) "regulations" means regulations made under this Act;

- (xix) "rules" means rules made under this Act;
- (xl) "sewage" means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works;
- (xli) "standards" means qualitative and quantitative standards for discharge of effluent and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the National Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations;
- (xlii) "sustainable development" means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs;
- (xliii) "territorial waters" shall have the same meaning as in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976).
- (xliv) "vessel" includes anything made for the conveyance by water of human beings or of goods; and
- (xlv) "waste" means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

3. **Establishment of the Pakistan Environmental Protection Council.**— (1) The Federal Government shall, by notification in the official Gazette, establish a Council to be known as the Pakistan Environmental Protection Council consisting of—

- | | |
|---|------------------|
| (i) Prime Minister or such other person as the Prime Minister may nominate in this behalf. | Chairperson |
| (ii) Minister incharge of the Ministry or Division dealing with the subject of environment. | Vice Chairperson |
| (iii) Chief Ministers of the Provinces. | Members |
| (iv) Ministers Incharge of the subject of environment in the Provinces. | Members |
| (v) Such other persons not exceeding thirty-five as the federal Government may appoint, of which at least twenty shall be non-officials including five representatives of the Chambers of Commerce and Industry | Members |

and industrial associations and one or more representatives of the Chambers of Agriculture, the medical and legal professions, trade unions, and non-governmental organizations concerned with the environment and development, and scientists, technical experts and educationists

(v) Secretary to the Government of Pakistan, incharge of the Ministry or Division dealing with the subject of environment

Member/
Secretary

(2) The Members of the Council, other than ex-officio members, shall be appointed in accordance with the prescribed procedure and shall hold office for a term of two years.

(3) The Council shall frame its own rules of procedure.

(4) The Council shall hold meetings, as and when necessary, but not less than two meetings, shall be held in a year.

(5) The Council may constitute committees of its members and entrust them with such functions as it may deem fit, and the recommendations of the committees shall be submitted to the Council for approval.

(6) The Council, or any of its committees, may invite any technical expert or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

4. Functions and powers of the Council.—(1) The Council shall—

- (a) co-ordinate and supervise enforcement of the provisions of this Act; and
- (b) approve comprehensive national environmental policies and ensure their implementation within the framework of a national conservation strategy as may be approved by the Federal Government from time to time;
- (c) approve the National Environmental Quality Standards;
- (d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources.
- (e) co-ordinate integration of the principles and concerns of sustainable development into national development plans and policies;
- (f) consider the National Environment Report and give appropriate directions thereon;

(2) The Council may, either itself or on the request of any person or organization, direct the Federal Agency or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources or to undertake research in any aspect of environment.

5. Establishment of the Pakistan Environmental Protection Agency.—(1) The Federal Government shall, by notification in the official Gazette, establish the Pakistan Environmental Protection Agency to exercise the powers and perform the functions assigned to it under this Act and the rules and regulations made thereunder.

(2) The Federal Agency shall be headed by a Director-General who shall be appointed by the Federal Government on such terms and conditions as it may determine.

(3) The Federal Agency shall have such administrative, technical and legal staff, as the Federal Government may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the Federal Agency shall be exercised and performed by the Director-General.

(5) The Director-General may, by general or special order, delegate any of the powers and functions to staff appointed under sub-section (3).

(6) For assisting the Federal Agency in the discharge of its functions the Federal Government shall establish Advisory Committees for various sectors and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

6. Functions of the Federal Agency.—(1) The Federal Agency shall—

- (a) administer and implement this Act and the rules and regulations made;
- (b) prepare, in co-ordination with the appropriate Government Agency and in consultation with the concerned sectoral Advisory Committees, national environmental policies for approval by the Council;
- (c) take all necessary measures for the implementation of the national environmental policies approved by the Council;
- (d) prepare and publish an annual National Environment Report on the state of the environment;
- (e) prepare, establish and revise the National Environmental Quality Standards with approval of the Council;

Provided that before seeking approval of the Council, the Federal Agency shall publish the proposed National Environmental Quality Standards for public opinion in accordance with the prescribed procedure; and

- (f) ensure enforcement of the National Environmental Quality Standards;
- (g) establish standards for the quality of the ambient air, water and land, by notification in the official Gazette in consultation with the Provincial Agency concerned:

Provided that—

- (i) different standards for discharge or emission from different sources and for different areas and conditions may be specified;
- (ii) where standards are less stringent than the National Environmental Quality Standards prior approval of the Council shall be obtained;
- (iii) certain areas, with the approval of the Council, may exclude from carrying out specific activities, projects from the application of such standards;
- (h) co-ordinate environmental policies and programmes nationally and internationally;
- (i) establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;
- (j) take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development;
- (k) certify one or more laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation for the purposes of this Act.
- (l) identify the needs for and initiate legislation in various sectors of the environment;
- (m) render advice and assistance in environmental matters including such information and data available with it as may be required for carrying out the purposes of this Act:

Provided that the disclosure of such information shall be subject to the restrictions contained in the proviso to sub-section (3) of section 12;

- (n) assist the local councils, local authorities, Government Agencies and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the standards established by it;
- (o) provide information and guidance to the public on environmental matters;
- (p) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;
- (q) promote public education and awareness of environmental issues through mass media and other means including seminars and workshops;
- (r) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned person in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;
- (s) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;
- (t) take or cause to be taken all necessary measures for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and
- (u) perform any function which the Council may assign to it.

(2) The Federal Agency may—

- (a) undertake inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organization;
- (b) request any person to furnish any information or data relevant to its functions;
- (c) initiate with the approval of the Federal Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material, or information and participate in international seminars or meetings;
- (d) recommend to the Federal Government the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including—
 - (i) incentives, prizes awards, subsidies, tax exemptions, rebates and depreciation allowances; and

- (ii) taxes, duties, cesses and other levies;
- (e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for establishment of similar laboratories in the private sector; and
- (f) provide or arrange, in accordance with such procedure as may be prescribed, financial assistance for projects designed to facilitate the discharge of its functions.

7. **Powers of the Federal Agency.**—Subject to the provisions of this Act, the Federal Agency may—

- (a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both moveable and immovable;
- (b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;
- (c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or the rules and regulations;
- (d) enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;
- (e) appoint with the approval of the Federal Government and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;
- (f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;
- (g) enter and inspect and under the authority of a search warrant issued by the Environmental Court or Environmental Magistrate, search at any reasonable time, any land, building, premises, vehicle or vessel or other place where or in which there are reasonable grounds to believe that an offence under this Act has been, or is being, committed;
- (h) take samples of any materials, products, articles or substances or of the effluent, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;
- (i) arrange for test and analysis of the samples at a certified laboratory;

- (j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time:

Provided that the power under clauses (f), (h), (I) and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898), or the rules made under this Act and under the direction of the Environmental Court or Environmental Magistrate; and

- (k) establish a National Environmental Co-ordination Committee comprising the Director-General as its chairman and the Director Generals of the Provincial Environmental Protection Agencies and such other persons as the Federal Government may appoint as its members to exercise such powers and perform such functions as may be delegated or assigned to it by the Federal Government for carrying out the purposes of this Act and for ensuring inter provincial co-ordination in environmental policies.

8. Establishment, powers and functions of the Provincial Environmental Protection Agencies.—(1) Every Provincial Government shall, by notification in the official Gazette, establish an Environmental Protection Agency, to exercise such powers and perform such functions as may be delegated to it by the Provincial Government under sub-section (2) of section 26.

(2) The Provincial Agency shall be headed by a Director-General who shall be appointed by the Provincial Government on such terms and conditions as it may determine.

(3) The Provincial Agency shall have such administrative, technical and legal staff as the Provincial Government may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the Provincial Agency shall be exercised and performed by the Director-General.

(5) The Director General may, by general or special order, delegate any of the powers and functions to staff appointed under sub-section (3).

(6) For assistance of the Provincial Agency in the discharge of its functions, the Provincial Government shall establish Sectoral Advisory Committees for various sectors and appoint members from amongst eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

9. Establishment of the Provincial Sustainable Development Funds.— (1) There shall be established in each Province a Sustainable Development Fund.

(2) The Provincial Sustainable Development Fund shall be derived from the following sources, namely:—

- (a) grants made or loans advanced by the Federal Government or the Provincial Governments;
- (b) aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, national or international agencies, and non-governmental organizations; and
- (c) contributions from private organizations and other persons.

(3) The Provincial Sustainable Development Fund shall be utilized in accordance with such procedure as may be prescribed for—

- (a) providing financial assistance to the projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any aspect of environment; and
- (b) any other purpose which in the opinion of the Board shall help achieve environmental objectives and the purposes of this Act.

10. **Management of the Provincial Sustainable Development Fund.**—(1) The Provincial Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of—

- | | |
|---|-----------------------|
| (i) Chairman, Planning and Development Board/Additional Chief Secretary Planning and Development Department | Chairperson |
| (ii) such officers of the Provincial Governments, not exceeding six, as the Provincial Government may appoint including Secretaries incharge of the Finance, Industries and Environment Departments | Members not exceeding |
| (iii) such non-official persons not exceeding ten as the Provincial Government may appoint including representatives of the Provincial Chamber of Commerce and Industry, non governmental organizations, and major donors. | Members |
| (iv) Director-General of the Provincial Agency | Member/Secretary |

(2) In accordance with such procedure and such criteria as may be prescribed, the Board shall have the power to—

- (a) sanction financial assistance for eligible projects;

- (b) invest moneys held in the Provincial Sustainable Development Fund in such profit-bearing Government bonds, savings schemes and securities as it may deem suitable; and
- (c) take such measures and exercise such powers as may be necessary for utilization of the Provincial Sustainable Development Fund for the purposes specified in sub-section (3) of section 9.

(3) The Board shall constitute committees of its members to undertake regular monitoring of projects financed from the Provincial Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts and performance evaluation based on the progress reports.

11. Prohibition of certain discharges or emissions.—(1) Subject to the provisions of this Act and the rules and regulations no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable, the standards established under sub-clause (1) of clause (g) of sub-section (1) of section 6.

(2) The Federal Government may levy a pollution charge on any person who contravenes or fails to comply with the provisions of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed.

(3) Any person who pays the pollution charge levied under sub-section (2) shall not be charged with an offence with respect to that contravention or failure.

(4) The provisions of sub-section (3) shall not apply to projects which commenced industrial activity on or after the thirtieth day of June, 1994.

12. Initial environmental examination and environmental impact assessment.—(1) No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Protection Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effects an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof.

(2) The Government Agency shall subject to standards fixed by the Federal Environmental Protection Agency—

- (a) review the initial environmental examination and accord its approval, or require submission of an environmental impact assessment by the proponent; or
- (b) review the environmental impact assessment and accord its approval subject to such conditions as it may deem fit to impose, require that the environmental impact

assessment be re-submitted after such modifications as may be stipulated or reject the project as being contrary to environmental objectives.

(3) Every review of an environmental impact assessment shall be carried out with public participation and no information will be disclosed during the course of such public participation which relates to—

- (i) trade, manufacturing or business activities, processes or techniques of a proprietary nature, or financial, commercial, scientific or technical matters which the proponent has requested should remain confidential, unless for reasons to be recorded in writing, the Director General of the Federal Agency is of the opinion that the request for confidentiality is not well-founded or the public interest in the disclosure outweighs the possible prejudice to the competitive position of the project or its proponent; or
- (ii) international relations, national security or maintenance of law and order, except with the consent of the Federal Government; or
- (iii) matters covered by legal professional privilege.

(4) The Government Agency shall communicate its approval or otherwise within a period of four months from the date the initial environmental examination or environmental impact assessment is filed complete in all respects in accordance with the prescribed procedure, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations.

(5) Subject to sub-section (4) the appropriate Government may in a particular case extend the aforementioned period of four months if the nature of the project so warrants.

(6) The provisions of sub-sections (1), (2), (3), (4) and (5) shall apply to such categories of projects and in such manner as may be prescribed.

(7) The Government Agency shall maintain separate registers for initial environmental examination and environmental impact assessment projects, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open to inspection by the public at all reasonable hours and the disclosure of information in such registers shall be subject to the restrictions specified in sub-section (3).

13. Prohibition of import of hazardous waste.—No person shall import hazardous waste into Pakistan and its territorial waters, Exclusive economic Zone and historic waters.

14. Handling of hazardous substances.—Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except—

- (a) under a licence issued by the Federal Agency and in such manner as may be prescribed; or
- (b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party.

15. Regulation of motor vehicles.—(1) Subject to the provisions of this Act, and the rules and regulations, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the National Environmental Quality Standards, or where applicable the standards established under clause (g) of sub-section (1) of section 6.

(2) For ensuring compliance with the standards mentioned in sub-section (1), the Federal Agency may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as may be prescribed.

(3) Where a direction has been issued by the Government Agency under subsection (2) in respect of any motor vehicles or class of motor vehicles, no person shall operate any such vehicle till such direction has been complied with.

16. Environmental protection order.—(1) Where the Federal Agency or a Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of the provisions of this Act, rules or regulations or of the conditions of a licence, and is likely to cause, or is causing, or has caused an adverse environmental effect, the Federal Agency or, as the case may be, the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures that the Federal Agency or Provincial Agency may consider necessary within such period as may be specified in the order.

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include—

- (a) immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;

- (b) installation, replacement or alteration of any equipment or thing to eliminate, control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;
- (c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances; and
- (d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Federal Agency or, Provincial Agency.

(3) Where the person, to whom directions under sub-section (1) are given, does not comply therewith, the Federal Agency or Provincial Agency may, in addition to the proceedings initiated against him under this Act, the rules and regulations, itself take or cause to be taken such measures specified in the order as it may deem necessary and may recover the reasonable costs of taking such measures from such person as arrears of land revenue.

17. Penalties.—(1) Whoever contravenes or fails to comply with the provisions of sections 11, 12, 13 or section 16 or any order issued thereunder shall be punishable with fine which may extend to one million rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues:

Provided that if contravention of the provisions of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

(2) Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any licence, any order or direction, issued by the Council or, the Federal Agency or Provincial Agency, shall be punishable with fine which may extend to one hundred thousand rupees, and in case of continuing contravention or failure with an additional fine which extend to one thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-sections (1) and (2), the Environmental Court and Environmental Magistrate; as the case may be, shall, in passing sentence, take into account the extent and duration of the contravention or failure constituting the offence and the attendant circumstances.

(4) Where an accused has been convicted of an offence under sub-section (1) and the Environmental Court is satisfied that as a result of the commission of the offence monetary benefits have accrued to the offender, the Environmental Court may order the offender to pay, in addition to the fines under sub-section (1), further additional fine commensurate with the amount of the monetary benefits.

(5) Where a person convicted under sub-sections (1) or sub-section (2) had been previously convicted for any contravention under this Act, the Environmental Court or, as the case may be, Environmental Magistrate may, in addition to the punishment awarded thereunder—

- (a) endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of Commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry;
- (b) sentence him to imprisonment for a term which may extend to two years;
- (c) order the closure of the factory;
- (d) order confiscation of the factory, machinery, and equipment, vehicle, material or substance, record or document or other object used or involved in contravention of the provisions of the Act;

Provided that for a period of three years from the date of commencement of this Act the sentence of imprisonment shall be passed only in respect of persons who have been previously convicted for more than once for any contravention of sections 11, 13, 14 or 16 involving hazardous waste;

- (e) order such person to restore the environment at his own cost, to the conditions existing prior to such contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Federal Agency or, as the case may be, Provincial Agency; and
- (f) order that such sum be paid to any person as compensation for any loss, bodily injury, damage to his health or property suffered by such contravention.

(6) The Director-General of the Federal Agency or of a Provincial Agency or an officer generally or specially authorised by him in this behalf may, on the application of the accused compound an offence under this Act with the permission of the Environmental Tribunals or Environmental Magistrate in accordance with such procedure as may be prescribed.

(7) Where the Director-General of the Federal Agency or of a Provincial Agency is of the opinion that a person has contravened any provision of Act he may, subject to the rules, by notice in writing to that person require him to pay to the Federal Agency or, as the case may be, Provincial Agency an administrative penalty in the amount set out in the notice for each day the contravention continues; and a person who pays an administrative penalty for a contravention shall not be charged under this Act with an offence in respect of such contravention.

(8) The provisions of sub-sections (6) and (7) shall not apply to a person who has been previously convicted of offence or who has compounded an offence under this Act who has paid an administrative penalty for a contravention of any provision of this Act.

18. Offences by bodies corporate.— Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance of, or is attributed to any negligence on the part of, any director, partner, manager, secretary or other Officer of the body corporate, such director, partner, manager, secretary or other officer of the body corporate, shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly:

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XLVII of 1984), only the Chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation.— For the purposes of this section, "body corporate" includes a firm, association of persons and a society registered under the Societies Registration Act, 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

19. Offences by Government Agencies, local authorities or local councils.— Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of, the Head or any other officer of the Government Agency, local authority or local council, such Head or other officer shall also be deemed guilty of such contravention along with the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

20. Environmental Tribunals.—(1) The Federal Government may, by notification in the official gazette, establish as many Environmental Tribunals as it consider necessary and, where it establishes more than one Environmental Tribunals, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.

(2) An Environmental Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as, a judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by the Federal Government of which at least one shall be a technical member with suitable professional qualifications and experience, in the environmental field as may be prescribed.

(3) For every sitting of the Environmental Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.

(4) A decision of an Environmental Tribunal shall be expressed in terms of the opinion of the majority of its members, including the Chairperson, or if the case has been decided by the Chairperson and only one of the members and a there is a difference of

opinion between them, the decision of the Environmental Tribunal shall be expressed in terms of the opinion of the Chairperson.

(5) An environmental Tribunal shall not, merely because of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who has given evidence, and may act on the evidence already recorded by, or produced, before it.

(6) An Environmental Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.

(7) No act or proceeding of an Environmental Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution, of, the Environmental Tribunal.

(8) The terms and conditions of service of the Chairperson and members of the Environmental Tribunal shall be such as may be prescribed.

21. Jurisdiction and powers of Environmental Tribunals.—(1) An Environmental Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act or the rules and regulations made thereunder.

(2) All contravention punishable under sub-section (1) of section 17 shall exclusively be triable by an Environmental Tribunal.

(3) An Environmental Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by—

(a) the Federal Agency or any Government Agency or local council; and

(b) any aggrieved person, who has given notice of not less than thirty days to the Federal Agency, or the Provincial Agency concerned, of the alleged contravention and of his intention to make a complaint to the Environmental Tribunal.

(4) In exercise of its criminal jurisdiction, the Environmental Tribunals shall have the same powers as are vested in Court of Session under the Code of Criminal Procedure, 1898 (Act V of 1898).

(5) In exercise of the appellate jurisdiction under section 22 the Environmental Tribunals shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).

(6) In all matters with respect to which no procedure has been provided for in this Act, the Environmental Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

(7) An Environmental Tribunal may, on application filed by any officer duly authorised in this behalf by the Director-General of the Federal Agency or of Provincial Agency, issue bailable warrant for the arrest of any person against whom reasonable suspicion exist, of his having been involved in contravention punishable under sub-section (1) of Section 17:

Provided that such warrant shall be applied for, issued, and executed in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898):

Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant he shall be released from custody, failing which he shall be taken or sent without delay to the officer in-charge of the nearest police station.

(8) All proceedings before the Environmental Tribunal shall be deemed to be judicial proceedings within the meaning of section 193 and 228 of the Pakistan Penal Code (Act XLV of 1860), and the Environmental Tribunal shall be deemed to be a court for the purpose of section 480 and 482 of the Code of Criminal Procedure, 1898 (Act V of 1898).

(9) No court other than an Environmental Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Tribunal extends under this Act, the rules and regulations made thereunder.

(10) Where the Environmental Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

22. Appeals to the Environmental Tribunal.—(1) Any person aggrieved by any order or direction of the Federal Agency or any Provincial Agency under any provision of this Act, and rules or regulations may prefer an appeal with the Environmental Tribunal within thirty days of the date of communication of the impugned order or direction to such person.

(2) An appeal to the Environmental Tribunal shall be in such form, contain such particulars and be accompanied by such fees as may be prescribed.

23. Appeals from orders of the Environmental Tribunal.—(1) Any person aggrieved by any final order or by any sentence of the Environmental Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.

(2) An appeal under sub-section (1) shall be heard by a Bench of not less than two Judges.

24. Jurisdiction of Environmental Magistrates.—(1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contravention punishable under sub-section (2) of section 17 shall exclusively be triable by a judicial Magistrate of the first class as Environmental Magistrate especially empowered in this behalf by the High Court.

(2) An Environmental Magistrate shall be competent to impose any punishment specified in sub-sections (2) and (4) of section 17.

(3) An Environmental Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by—

- (a) the Federal Agency, Provincial Agency, or Government Agency or a local council; and
- (b) any aggrieved person.

25. Appeals from orders of Environmental Magistrates.—Any person convicted of any contravention of this Act or the rules or regulations by an Environmental Magistrate may, within thirty days from the date of his conviction, appeal to the Court of Sessions whose decision thereon shall be final.

26. Power to delegate.—(1) The Federal Government may, by notification in the official Gazette, delegate any of its or of the Federal Agency's powers and functions under this Act and the rules and regulations to any Provincial Government, any Government Agency, local council or local authority.

(2) The Provincial Government may, by notification in the official Gazette, delegate any of its or of the Provincial Agency's powers or functions under this Act and the rules and regulations to any Government Agency of such Provincial Government or any local council or local authority in the Province.

27. Power to give directions.—In the performance of their functions under this Act—

- (a) the Federal Agency and Provincial Agencies shall be bound by the directions given to them in writing by the Federal Government; and
- (b) a Provincial Agency shall be bound by the directions given to it in writing by the Provincial Government.

28. Indemnity.—No suit, prosecution or other legal proceedings shall lie against the Federal or Provincial Governments, the Council, the Federal Agency or Provincial Agencies, the Director-Generals of the Federal Agency and the Provincial Agency, members, officers, employees, experts, advisers, committees or consultants of the Federal or

Provincial Agencies or the Environmental Tribunal or Environmental Magistrates or any other person for anything which is in good faith done or intended to be done under this Act or the rules or regulations made thereunder.

29. Dues recoverable as arrears of land revenue.—Any dues recoverable by the Federal Agency or Provincial Agency under this Act, or the rules or regulations shall be recoverable as arrears of land revenue.

30. Act to override other laws.—The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force.

31. Power to make rules.—The Federal Government may, by notification in the official Gazette, make rules for carrying out the purposes of this Act including rules for implementing the provisions of the international environmental Agreements, specified in the Schedule to this Act.

32. Power to amend the Schedule.—The Federal Government may, by notification in the official Gazette, amend the Schedule so as to add any entry thereat or modify or omit any entry therein.

33. Power to make regulations.—(1) For carrying out the purposes of this Act, the Federal Agency may, by notification in the official Gazette and with the approval of the Federal Government, make regulations not inconsistent with the provisions of this Act or the rules made thereunder.

(2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for—

- (a) submission of periodical reports, data or information by any Government agency, local authority or local council in respect of environmental matters;
- (b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;
- (c) appointment of officers, advisers, experts, consultants and employees;
- (d) levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented;
- (e) monitoring and measurement of discharges and emissions;
- (f) categorization of projects to which, and the manner in which, section 12 applies;

- (g) laying down of guidelines for preparation of initial environmental examination and environmental impact assessment and Development of procedures for their filing, review and approval;
- (h) providing procedures for handling hazardous substances; and
- (i) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

34. Repeal, savings and succession.—(1) The Pakistan Environmental Protection Ordinance 1983 (XXXVII of 1983) is hereby repealed.

(2) Notwithstanding the repeal of the Pakistan Environmental Protection Ordinance, 1983 (XXXVII of 1983), any rules or regulations or appointments made, orders passed, notifications issued, powers delegated, contracts entered into, proceedings commenced, rights acquired liabilities incurred, penalties, rates, fees or charges levied, things done or action taken under any provisions of that Ordinance shall, so far as they are not inconsistent with the provisions of this Act be deemed to have been made, passed, issued, delegated, entered into, commenced, acquired, incurred, levied, done or taken under this Act.

(3) On the establishment of the Federal Agency and Provincial Agencies under this Act, all properties, assets and liabilities pertaining to the Federal Agency and Provincial Agencies established under that Ordinance shall vest in and be the properties, assets and liabilities, as the case may be, of the Federal Agency and Provincial Agency established Under this Act.

SCHEDULE
(SEE SECTION 31)

1. International Plant Protection Convention, Rome, 1951.
2. Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome, 1956.
3. Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia (as amended), Rome, 1963.
4. Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, 1971 and its amending Protocol, Paris, 1982.
5. Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention), 1972.
6. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973.
7. Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979.
8. Convention on the Law of the Sea, Montego Bay, 1982.
9. Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985.
10. Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 and amendments thereto.
11. Agreement on the Network of Agriculture Centres in Asia and the Pacific, Bangkok, 1988.
12. Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989.
13. Convention on Biological Diversity, Rio de Janeiro, 1992.
14. United Nations Framework Convention on Climate Change, Rio De Janeiro, 1992.

**Guidelines for the
Preparation and
Review of
Environmental Reports**

October 1997

- the public to understand the proposal and its impact on the community and the environment.

Information provided should be clear, concise, objective (where possible and where appropriate), and supported by maps or other descriptive detail. When subjective material is presented, it should be clearly represented as just that, and the impression that it is factual should be avoided. Repetitive or general non-specific data is distracting and is not relevant to the decision-making process. The use of jargon should be avoided. It is recommended that the Environmental Report be edited to ensure consistency of style and accuracy of transference of information from any appendices to the main document. The Environmental Report should make reference to all relevant studies and investigations that have been carried out in support of the proposal, or other studies, reports or literature used in the Environmental Report. These supporting documents should be available to all stakeholders at the time the Environmental report is publicly advertised.

The information should be arranged so that it is readily accessible and easily understood by all parties. It should clearly state issues in a non-technical way.

5.2 Main features of an Environmental Report

A general description of the format and content of an Environmental Report follows. The general format may need to be varied to accommodate:

- specific Terms of Reference which may have been adopted;
- the treatment of alternatives which will vary: sometimes alternatives are not considered in any detail, other times alternatives are addressed early in the study and it is only the favoured alternative which is taken forward for detailed study;
- the structure of investigations will sometimes lead to a logical presentation which varies from the general model;
- the treatment of baseline data: while the general model allows for a description of expected conditions in an early section of the Report, it is not uncommon for the existing conditions to be described under the relevant impact heading (eg under noise impacts, the existing noise environment would be described, followed by predictions of the noise levels expected to be generated by the favoured proposal and the main alternatives).

With these caveats, a general format for an Environmental Report will include:

Executive or non-technical summary

This is the part of the report that most people will read. It is often the only part that people will read (including decision-makers). A two to four page executive summary should contain:

- title and location of the proposal
- name of the proponent
- name of the organisation preparing the Environmental Report
- a brief outline of the proposal
- the major impacts
- recommendations for mitigation and compensation
- proposed monitoring

For major proposals the Executive summary might extend to ten pages but it should not be any longer. The executive summary may usefully be distributed to the public as an information brochure. In such cases, the Responsible Authority may contribute advice on the decision making process, and where submissions should be lodged. If a public display is intended, the information brochure should also contain the details (dates, times and places) where the display can be viewed.

Description of the objectives of the proposal

This section should outline the objectives of the proposal, and set the basis for an evaluation of how well the preferred alternative satisfies those objectives.

Description of the proposal and its alternatives

This more detailed description of the proposal indicates any reasonable alternatives that would meet the proposal's objectives, including the possibility of the 'do-nothing' alternative. This section of the report would include:

- a. the status of the proposal in the project cycle, such as pre-feasibility, feasibility or detailed design;
- b. a description of the planning, design and implementation stages in only enough detail for impact forecasts and management measures to be understood and appreciated;
- c. the requirements for raw materials, water, energy, and equipment;
- d. the planned operational characteristics—hours of operation, processes, products;
- e. visual aids such as maps of the area, site and plant layout, flow charts of the production process, and photographs of the site and similar projects (particularly to convey an appreciation of the scale and nature of the equipment involved);
- f. a comparison of proposal options (such as size, siting, technology, layout, energy sources, source of raw materials); and
- g. a summary of the technical, economic and environmental features of the proposal.

Discussion of the proposal and current land use and policies

This section should show how the proposal (and the alternatives) fit into current land use controls, and whether they are compatible with relevant government policies and strategies.

Description of existing and expected conditions

This is often covered in too much detail in Environmental Reports. Only enough detail should be given to allow an understanding of the impact analysis and assessment. It should contain a description of the following aspects of the proposal as they are expected to be at the time of implementation of the proposal:

- the spatial and temporal boundaries adopted for the various aspects of the study;
- the existing (baseline) condition of the relevant biophysical and socio-economic environment as well as trends and the anticipated future environmental conditions should the project not go ahead; and
- environmentally sensitive areas of special or unique value (including biodiversity, scientific, socio-economic, cultural, visual and heritage).

Evaluation of the impacts for each alternative

For both the proposal and its alternatives, the Environmental Report requires a description of the potential beneficial and adverse environmental impacts, both direct and indirect, for each component of the environment identified as important during the screening and scoping stages. This should include:

- an assessment of any impact on the local population (including gender issues);
- the relevant environmental data and predictive methods used and any underlying assumptions made;
- any gaps in knowledge and uncertainties encountered;
- compliance with relevant environmental standards;
- the assessed significance of the impact, stating the standards or criteria used as a basis for judgement; and
- possible measures for avoiding or mitigating the impact.

Possible cumulative or multiplicative effects should also be highlighted. Wherever possible information should be presented in summary form to help readers assimilate the information and to make a quick comparison between alternatives.

environmental parameters to be monitored without an explanation as to why these are needed. The monitoring program needs to be detailed and quantified with:

- description of work tasks, skills required, tests required, duration and frequency;
- the institutional system by which the monitoring data will be collected, collated, analysed, interpreted and action taken, if necessary, to prevent or reduce unwanted impacts;
- measures to ensure the monitoring information is available to Federal and Provincial Departments and Agencies, and to the public;
- a justification of the cost of the monitoring program in terms of public health and other benefits. (A fuller treatment of Monitoring is given in Section 7).

Appendices

Appendices contain information that may be needed for reference or for detailed review by technical experts. All technical information and description of methods used to provide conclusions in the Environmental report should be included in Appendices when they are not suitable for the main text. Appendices should also contain:

- a glossary;
- an explanation of abbreviations;
- a summary of the management of the environmental study process, including the public involvement, and listings of individuals or agencies consulted;
- sources of data and information and a full list of all reference material used;
- a list of names, qualifications and roles of the team members who carried out the study; and
- Terms of Reference for the Environmental report and those given to individual specialists.

Appendices are often best included in a separate volume, which will not generally require such extensive circulation as the main document.

5.3 Distribution of reports, and other forms of presentation

As a general rule, the report should go not only to government departments and decision-makers, but also to anyone who has a legitimate interest in the proposal. In most cases the executive summary is particularly useful to distribute to those who don't want to read the whole document. It can also be relatively easily translated into other languages where this would assist interested people to understand the proposal.

If formal public consultation has occurred in the time between scoping and the production of the report, it may be useful to have a section showing comments received, and responses to these comments.

Other forms of presentation of the findings should also be considered such as:

- local language video;
- local radio and television;
- presentations;
- newsletters and information sheets;
- displays, particularly if they are supported by members of the study team;
- gatherings based on local community groups;
- small meetings and workshops.

All have their place in effective communication, but none can be effective without the preliminary work involved in producing a clear and comprehensive report, factually accurate and consistent in its data.

ANNEXURE-IV

APEX ENVIRONMENT LABORATORYSuite # 4, 2nd Floor, Link Arcade, Mode Town Link Road, Lahore

Phone: 92-042-5855508; 0300-8470059; Fax: 042-5855508,5830687; E-mail: ectech_ectech@yahoo.com

(Laboratory certified as "Environmental Laboratory" by the Environmental Protection Agency, Government of the Punjab vide its Memo No: 86/DD (Labs.) EPA, dated November 11, 2002, certificate No: 86/DD (Labs.) EPD/05

Ambient Air Monitored Data

Reference Point	Date	Time	CO (ppm)	SO ₂ (ppm)	NO ₂ (ppm)
1. Proposed Plant Site (Eastern Direction)	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
2. ----- do -----	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
3. ----- do -----	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
4. Proposed Plant Site (Southern Direction)	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
5. ----- do -----	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
6. ----- do -----	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
7. Proposed Plant Site (Western Direction)	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
8. ----- do -----	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
9. ----- do -----	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
10. Proposed Plant Site (Northern Direction)	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
11. ----- do -----	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
12. ----- do -----	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D
13. Center of the Proposed Plant Site	30-09-04	Night	N.D	N.D	N.D
	01-10-04	Day	N.D	N.D	N.D

N.D = Not Detected

ANNEXURE-V

APEX ENVIRONMENT LABORATORYSuite # 4, 2nd Floor, Link Arcade, Model Town Link Road, Lahore

Phone: 92-042-5855508; 0300-8470059, Fax: 042-5855508, 5870087; E-mail: ectech_ectech@yahoo.com

(Laboratory certified as "Environmental Laboratory" by the Environmental Protection Agency, Government of the Punjab vide its Memo No: 86/DD (Labs.)/EPA, dated November 14, 2002, certificate No: 86/DD (Labs.)/EPD/05

Ambient Particulate Matter Monitored Data

Reference Point	Ambient Particulate Matter (mg/Nm ³)
1. Eastern Side of Proposed Plant Site	0.6
2. Southern Side of Proposed Plant Site	0.9
3. Western Side of Proposed Plant Site	0.6
4. Northern Side of Proposed Plant Site	0.8
5. Center of the Proposed Plant Site	0.5

ANNEXURE-VI

APEX ENVIRONMENT LABORATORY

Suite # 4, 2nd Floor, Liaqat Arcade, Model Town Link Road, Lahore

Phone: 92-042-5855508, 0300-8470059; Fax: 042-5855508, 5830087; E-mail: ectech_ectech@yahoo.com

(Laboratory certified as "Environmental Laboratory" by the Environmental Protection Agency, Government of the Punjab vide its Memo No: 86/DD (Labs.) EPA, dated November 14, 2002, certificate No: 86/DD (Labs.)EPD/05

Baseline Noise Level Monitored Data

Reference Point # 1: Eastern Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	41	41	41	40	41	41	40	41	41	41	40.80
01-10-04	Day	39	39	40	40	40	39	39	39	40	40	39.50

Reference Point # 2: Eastern Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	40	40	40	40	40	40	40	40	41	40	40.10
01-10-04	Day	38	38	38	38	39	38	38	38	38	39	38.20

Reference Point # 3: Eastern Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	42	42	42	42	42	42	42	42	42	42	42.00
01-10-04	Day	47	47	47	47	46	47	46	46	47	47	46.70

Reference Point # 4: Southern Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	42	43	42	42	42	43	42	43	42	42	42.30
01-10-04	Day	53	53	53	53	53	53	52	53	52	53	52.80

Reference Point # 5: Southern Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	55	55	60	65	55	55	55	60	55	55	57.00*
01-10-04	Day	48	48	48	48	47	47	48	48	47	47	47.60

* Shouting was held adjacent to the proposed plant site.

Reference Point # 6: Southern Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	40	41	41	41	41	41	41	40	40	40	40.60
01-10-04	Day	44	44	44	44	45	44	44	44	43	44	44.00

Reference Point # 7: Western Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	38	38	37	37	38	38	38	38	37	38	37.70
01-10-04	Day	47	47	47	46	46	47	46	46	47	47	46.60

Reference Point # 8: Western Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	31	31	31	31	32	31	32	32	32	31	31.40
01-10-04	Day	35	35	35	35	36	35	34	34	35	36	35.00

Reference Point # 9: Western Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	34	34	34	34	34	35	34	35	34	34	34.20
01-10-04	Day	36	35	35	36	36	36	35	35	36	35	35.50

Reference Point # 10: Northern Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	36	36	36	36	37	37	35	35	36	37	36.10
01-10-04	Day	39	39	38	39	38	39	39	38	39	39	38.70

Reference Point # 11: Northern Side of Plant Site

Date	Time	dB(A)										Average
30-09-04	Night	40	40	40	39	39	40	40	39	39	40	39.60
01-10-04	Day	41	41	41	41	41	41	42	41	41	41	41.10

Reference Point # 12: Northern Side of Plant Site

Date	Time	dB(A)										Average	
30-09-04	Night	39	39	39	40	40	39	39	39	39	39	39	39.20
01-10-04	Day	42	42	42	42	42	42	41	42	42	42	42	41.90

Reference Point # 13: Center of Plant Site

Date	Time	dB(A)										Average	
30-09-04	Night	41	41	41	41	41	40	40	40	41	40	40	40.60
01-10-04	Day	44	44	44	45	44	44	43	44	44	44	44	44.00

ANNEXURE-VII

APEX ENVIRONMENT LABORATORYSuite # 4, 2nd Floor, Link Arcade, Model Town Link Road, Lahore

Phone: 92-042-5855508; 0300-8470059; Fax: 042-5855505, 5830087; E-mail: ectech_ectech@yahoo.com

(Laboratory certified as "Environmental Laboratory" by the Environmental Protection Agency, Government of the Punjab vide its Memo No: 86/DD (Labs.) EPA, dated November 14, 2002, certificate No: 86/DD (Labs.)EPD/05

Arabian Sea Water Analysis Report (Near Village Restaurant)

Parameters	Lab. Results	NEQS Limiting Values
1. pH	7.2	6-9
2. Turbidity (FAU/NTU)	7.0	no limiting value
3. Total Suspended Solids, TSS (ppm)	6.0	200.0
4. Total Dissolved Solids, TDS (ppm)	37,000.0	3500.0
5. Chemical Oxygen Demand, COD (ppm)	2250.0	150.0
6. Biochemical Oxygen Demand, BOD ₅ (ppm)	1595.0	80.0
7. Sulphates (ppm)	552.0	600.0
8. Sulphides (ppm)	N.D	1.0
9. Chlorides (ppm)	21,050.0	1000.0
10. Free Chlorine (ppm)	0.05	1.0
11. Total Hardness as CaCO ₃ (ppm)	3350.0	no limiting value
12. Chromium (ppm)	N.D	1.0
13. Copper (ppm)	0.21	1.0
14. Iron (ppm)	N.D	8.0
15. Nitrates (ppm)	2.3	no limiting value
16. Ammonia (ppm)	0.08	40.0
17. Manganese (ppm)	N.D	1.5
18. Oil & Grease (ppm)	0.7	10.0

N.D = Not Detected

ANNEXURE-VIII
National Environmental Quality Standards (NEQS)

REGISTERED NO. ^{M. 302}
L 7646

The Gazette  of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABAD, THURSDAY AUGUST 10, 2000

Part II

Statutory Notifications (S.R.O.)

Government of Pakistan

MINISTRY OF ENVIRONMENT, LOCAL GOVERNMENT AND RURAL
DEVELOPMENT

NOTIFICATION

Islamabad, the 8th August, 2000

S.R.O. 549 (1)/2000-in exercise of the powers conferred under came (c) of sub-section (1) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997). The Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to direct that the following further amendments shall be made in its Notification No S. R. O. 742 (1)/93. Dated the 24 th August, 1993, namely :-

In the aforesaid notification, in paragraph 2,....

(1289)

Price : Rs. 5.00

[4138 (2000)/Ex. Gaz.]

Page No. 1

(1) for Annex I. The following shall be substituted, namely.....

**NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR
MUNICIPAL AND LIQUID INDUSTRIAL EFFLUENTS (mg/l,
UNLESS OTHERWISE DEFINED)**

S. No.	Parameter	Revised Standards				
		Existing Standards	Into Inland Waters	Into Sewage Treatment(b)	Into Sea(b)	
1	2	3	4	5	6	
1.	Temperature or Temperature Increase		40°C	=<3°C	=<3°C	=<3°C
2.	pH value		6-10	6-9	6-9	6-9
3.	Biochemical Oxygen Demand (BOD) , at 20°C(1)		80	80	250	80*
4.	Chemical Oxygen Demand (COD)(1)		150	150	400	400
5.	Total suspended solids (TSS)		150	200	400	200
6.	Total dissolved solids (TDS).		3500	3500	3500	3500
7.	Grease and oil		10	10	10	10
8.	phenolic compounds (as phenol)		0.1	0.1	0.3	0.3
9.	Chloride (as Cl')		1000	1000	1000	SC***
10.	Fluoride (as F')		20	10	10	10
11.	Cyanide (as CN') total		2	1.0	1.0	1.0
12.	An-ionic detergents (as MB As) ()		20	20	20	20
13.	Sulphate (SO) *		600	600	1000	SC***
14.	Sulphide (S) ²		1.0	1.0	1.0	1.0
15.	Ammonia (NH ₃)		40	40	40	40

1	2	3	4	5	6
16.	Pesticides(3)	0.15	0.15	0.15	0.15
17.	Cadmium(1)	0.1	0.1	0.1	0.1
18.	Chromium trivalent and hexavalent(1)	1.0	1.0	1.0	1.0
19.	Copper(1)	1.0	1.0	1.0	1.0
20.	Lead(1)	0.5	0.5	0.5	0.5
21.	Mercury(4)	0.01	0.01	0.01	0.01
22.	Selenium(1)	0.5	0.5	0.5	0.5
23.	Nickel(1)	1.0	1.0	1.0	1.0
24.	Silver(4)	1.0	1.0	1.0	1.0
25.	Total Toxic metals	2.0	2.0	2.0	2.0
26.	Zinc	5.0	5.0	5.0	5.0
27.	Arsenic(1)	1.0	1.0	1.0	1.0
28.	Barium(1)	1.5	1.5	1.5	1.5
29.	Iron	2.0	8.0	8.0	8.0
30.	Manganese	1.5	1.5	1.5	1.5
31.	Boron(1)	6.0	6.0	6.0	6.0
32.	Chlorine	1.0	1.0	1.0	1.0

Explanations :

1. Assuming minimum dilution 1 : 10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency. By 1 : 10 Dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent.
2. Modified Benzene Alkyl Sulphate : assuming surfacetant as biodegradable.
3. Pesticides include herbicides, fungicides, and insecticides.
4. Subject to total toxic metal discharge should not exceed level given at S. No. 25.
5. Applicable only when and where sewage treatment is operational and BOD₅ = 80 mg/l is achieved by the sewage treatment system.

6. Provided discharge is not at shore and not within 10 miles of mangrove or other important estuaries.
- * The effluent should not result in temperature increase of more than ~~3~~^{6h}C at the edge of the zone where initial mixing and dilution take place in the receiving body. In case zone is not defined, use 100 meters from the point of discharge.
- ** The value for industry is 200 mg/l.
- *** Discharge concentration at or below sea concentration (SC).

- Note :...1. Dilution of liquid effluents to bring them to the NEQS limiting values is not permissible through fresh water mixing with the effluents before discharging into the environment.
2. The concentration of pollutants in water being used will be subtracted from the effluent for calculating the NEQS limits" and
- (2) for Annex II. The following shall be substituted, namely :-

"NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR INDUSTRIAL GASEOUS EMISSION (mg/Nm³, UNLESS OTHERWISE DEFINED).

S. No.	Parameter	Source of emission	Existing Standards	Revised Standards
1	2	3	4	5
1.	Smoke	Smoke opacity not to exceed	40% or 2 Ring-lemann Scale	40% or 2 Ring-lemann Scale or equivalent Smoke number.
2.	Particulate matter ⁽¹⁾	(a) Boilers and furnaces : (i) Oil fired (ii) Coal fired (iii) Cement kilns	300 500 200	300 500 300
		(b) Grinding crushing clinker coolers and related processes, metallurgical processes, converters, blast furnaces and cupolas.	500	500
3.	Hydrogen Chloride	Any	400	400
4.	Chlorine	Any	150	150
5.	Hydrogen fluoride	Any	150	150
6.	Hydrogen sulphide	Any	10	10

1	2	3	4	5
7.	Sulphur Oxides ⁽¹⁾ (²)	Sulfuricacid / Sulphonic acid plants Other Plants except power plants operating on oil and coal	400 400	5000 1700
8.	Carbon monoxide	Any	800	800
9.	lead	Any	50	50
10.	Mercury	Any	10	10
11.	Cadmium	Any	20	20
12.	Arsenic	Any	20	20
13.	Copper	Any	50	50
14.	Antimony	Any	20	20
15.	Zinc	Any	200	200
16.	Oxides of Nitrogen ⁽¹⁾	Nitricacid manufacturing unit other plants except power plants operating on oil or coal :	400	3000
		Gas fired	400	400
		Oil fired	—	600
		Coal fired	—	1200

Explanations :

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 per cent sulphur content in fuel oil. Higher content of sulphur will cause standards to be pro-rated.
3. In respect of emissions of sulphur dioxide and nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to National Environmental Quality Standards (NEQS) specified above. Comply with the following standards:-

A. Sulphur dioxide

Sulphur dioxide Background levels Micro-gram per cubic meter ug/m ³). Standards				
Background Air Quality (So ₂ Basis)	Annual Average	Max. 24-hours Interval	Criterion I Max. So ₂ Emission (Tons per Day per plant)	Criterion II Max allowable ground level increment to ambient (ug/m ³)

Unpolluted	< 50	< 200	500	50
Moderately Polluted*				
Low	50	200	500	50
High	100	400	100	10
Very Polluted**	> 100	> 400	100	10

* For intermediate values between 50 and 100 ug/m³ linear interpolations should be true.

** No projects with sulphur dioxide emissions will be recommended.*

B. Nitrogen Oxide

Ambient air concentrations of nitrogen oxides, expressed as NO₂ should not be exceed the following :-

Annual Arithmetic Mean 100ug/m³
(0.05 ppm)

Emission levels for stationary source discharges, before mixing with the atmosphere, should be maintained as follows :-

For fuel fired steam generators, as Nanogram (10- 9ram) per joule of heat input :

Liquid fossil fuel	:	:	130
Solid fossil fuel	:	:	300
Lignite fossil fuel	:	:	260

Note :- Dilution of gaseous emissions to bring them to the NEQS limiting value is not permissible through excess air mixing, blowing before emitting into the environment"

[File No. 14 (3)/98-TO-PEPC.]

HAFIZ ABDULLAH AWAN,
Deputy Secretary (adm.)

Guidelines for Self-Monitoring and Reporting by the Industry

Final Report
March 1998

The guidelines for self-monitoring and reporting by the industry was approved by the Pakistan Environmental Protection Council (PEPC) in August, 1999. The text of the Final Draft is as follows:

1. Scope

These guidelines would be applicable to industry both in public as well as private sectors.

2. Overview

The Environmental Standard Committee (ESC) was constituted in March 1996 to prepare recommendations for the implementation of National Environmental Quality Standards (NEQS). In its meeting held on September 23, 1997, ESC decided that guidelines for self monitoring will be prepared and finalized at the earliest after due consultation with the industry.

The proposed 'Guidelines for Self-Monitoring and Reporting by the Industry' covered in this document describe the monitoring and reporting guidelines for industrial effluents and gaseous emissions. Supporting guidelines on sampling procedures, handling, transport, storage and preservation of samples, procedures for analysis of various pollutants in the effluents/gaseous emissions and their flow rates measurements have also been prepared and issued.

3. Legal Basis

The Environmental Protection Act, 1997 approved by the President of Pakistan contains the following clauses that provide a legal basis for environmental monitoring:

- Section 6(1) (i): The Federal Agency shall establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors; and
- Section 11 Prohibition of certain discharge or emissions: (1) Subject to the provision of this Act and the rules and regulations made thereunder no person shall discharge or emit or allow the discharge or emission or any effluent or waste or air pollution or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6.

Application of the law would require monitoring and reporting against the complete list of NEQS issued under the relevant legislation. However, such an approach is neither necessary nor cost effective. Recognizing the lack of experience and technical capacity in the industry, the monitoring and reporting framework should be simple, and implementable in prevailing local conditions. In addition to legal considerations, the following factors have been given due consideration in development of the monitoring and reporting guidelines:

- **Pollution Levels:** Frequent monitoring is needed in the industry where pollution impacts are high.
- **Toxicity of Pollutants:** More toxic pollutants need to be measured more frequently.
- **Cost of Monitoring:** A balance has to be sought between the need for the data and the cost of acquiring the data.

4. Categorization of Industries

In accordance with the international standards and practices the industries have been categorized as follows:

- Category A.
- Category B.
- Category C.

5. Priority Parameters and Monitoring and Reporting Schedules

Priority parameters for liquid effluents and gaseous emissions and recommended monitoring frequencies for the three categories of industry are given in Tables A through F. Sample reporting formats are also attached. Explanatory notes are as follows:

The following two plant conditions have been considered:

- Normal plant operating conditions
- Start-up and Upset Conditions

For liquid effluents, a reporting frequency of monthly for Category A, quarterly for Category B, and biannually for Category C is recommended. For gaseous emissions, monitoring and reporting of relevant NEQS parameters is proposed in Table D. Reporting frequency of monthly for category A and quarterly for category B have been recommended (Tables E & F).

The level of emissions can be substantially higher during plant start-ups and upset conditions. In addition to priority parameters for monitoring under normal operating conditions, a shorter list of parameters for monitoring under plant start-up and upset conditions is proposed for Category A industries only. For selected industries, additional parameters and more frequent monitoring may be specified by EPA. In order to verify and monitor the self-reporting process, random checks will be made by EPAs from time to time in consultation with the industrial unit concerned. Interested NGOs will be allowed to

accompany EPAs on such visits to ensure transparency (and neutrality) in the monitoring process.

For parameters other than those for which pollution charges have been proposed, the existing NEQS will apply as given under section 11 (I) of Pakistan Environmental Protection Act, 1997.

6. Recording and Reporting of Plant Start-up and Upset Schedules

Industries in Category A would be required to maintain a record of times during which start-up and upset conditions occur. Total time for start-up and upset conditions would be reported on a periodic basis. Sample reporting formats are attached herewith.

7. New Industries

For the new industries, EIA guidelines may specifically set a prior requirement of Approval of Plant Operation. Once after the plant start-up, a comprehensive monitoring report for all NEQS parameters for normal plant operations may be required to establish that the plant does meet the environmental commitments made in the EIA submitted. Subsequent monitoring will then be limited to priority parameters only as suggested in this proposal.

8. Solid Waste

Regulations for solid waste are under preparation. Monitoring and reporting procedures for solid waste will be prepared after the NEQS for solid waste are approved by the PEPC and released by the Federal EPA.

9. Special Cases

Large industrial units and projects such as Saindek, Pakistan Steel Mills, Thermal Power Plants, Wah Ordinance Factory etc., will be categorized as special industries and would be identified by the concerned EPAs and EPDs. All special industries, in addition to compliance with these guidelines (for category A) may be required to follow more strict and specific monitoring and reporting requirements to be formulated by EPA.

10. Review and Revisions

Necessary changes in these guidelines will be made from time to time in view of the experience gained through implementation.

11. Environmental Database

In view of the large volumes and diverse nature of data, systems support will be required for compilation and management of data. Regular monitoring and reporting of data will help develop the environmental databases at provincial levels, which will be a part of the Federal EPA, National Environmental Database.

Table - A : Priority Parameters for Monitoring of Liquid Effluents: Category - A

S.No	Industry	Priority Parameters for Normal Plant Conditions to be Reported on a Monthly Basis ¹	Priority Parameters for Start-up and Upset Conditions to be Recorded on an Hourly Basis
1.	Chlor-Alkali (Mercury Cell)	Effluent Flow, Temperature, pH, TSS, Chlorine, Mercury, Chlorides	Effluent Flow, Temperature, pH, TSS, Mercury, Chlorides
2.	Chlor-Alkali (Diaphragm Cell)	Effluent Flow, Temperature, pH, TSS, Chlorine, Chlorides	Effluent Flow, Temperature, pH, TSS, Chlorides
3.	Metals Finishing and Electroplating ²	Effluent Flow, Temperature, pH, TSS, Oil & Grease, Arsenic, Cadmium, Chromium (trivalent), Chromium (hexavalent), Lead, Nickel, Mercury, Silver, Zinc, Fluorides, Cyanides	Effluent Flow, Temperature, pH, TSS
4.	Nitrogenous Fertilizer	Effluent Flow, Temperature, pH, TSS, Ammonia, COD	Effluent Flow, Temperature, pH, TSS
5.	Phosphate Fertilizer	Effluent Flow, Temperature, pH, TSS, Cadmium, Fluorides, COD	Effluent Flow, Temperature, pH, TSS
6.	Pulp and Paper	Effluent Flow, Temperature, pH, COD, TSS, TDS, Sulphides, BOD ₅	Effluent Flow, Temperature, pH, TDS, TSS
7.	Pesticides Formulation	Effluent Flow, Pesticides	Effluent Flow
8.	Petroleum Refining	Effluent Flow, Temperature, pH, COD, TSS, BOD ₅ , Oil & Grease, Phenolic Compounds	Effluent Flow, Temperature, pH, TSS
9.	Steel Industry ³	Effluent Flow, Temperature, pH, COD, TSS, TDS, Chromium (trivalent), Iron, Oil & Grease, Cadmium, Copper	Effluent Flow, Temperature, pH, TSS
10.	Synthetic Fiber	Effluent Flow, Temperature, pH, BOD ₅ , COD, TSS, Oil & Grease, Sulphides	Effluent Flow, Temperature, pH, TSS
11.	Tanning and Leather Finishing	Effluent Flow, Temperature, pH, BOD ₅ , COD, TSS, Sulphide, Oil & Grease, Chromium (trivalent), Chromium (hexavalent), TDS, Phenolic Compounds	Effluent Flow, Temperature, pH, TSS
12.	Textile Processing	Effluent Flow, Temperature, pH, COD, TSS, TDS, Chromium, Copper, BOD ₅	Effluent Flow, Temperature, pH, TSS
13.	Pigments and Dyes	Effluent Flow, pH, Temperature, COD, Lead, Copper, Zinc	Effluent Flow, Temperature, pH
14.	Thermal Power Plants (oil fired and coal fired)	Effluent Flow, Temperature, pH, TSS, Oil & Grease	Effluent Flow, Temperature, pH
15.	Rubber Products	COD, Cadmium, TSS	TSS
16.	Paints, Varnishes & Lacquers	pH, TSS, COD, Lead, Chromium, Cadmium, Zinc, Barium	pH, TSS
17.	Pesticides	COD, Mercury, Pesticides	COD
18.	Printing	COD, Lead	COD
19.	Industrial Chemicals	pH, COD, TDS, Phenolic Compounds, Cyanide, Ammonia, cadmium, Lead ² , Chromium ² , Mercury ² , Nickel ² , Zinc ² , Arsenic ²	pH, COD, TDS
20.	Oil & Gas Production	Effluent Flow, Temperature, pH, COD, TSS, TDS, Oil & Grease, Chloride, BOD ₅ , Phenolic Compounds	Effluent Flow, Temperature, pH, TSS, TDS
21.	Petrochemicals	Effluent Flow, Temperature, pH, COD, TSS, TDS, Oil & Grease, BOD ₅ , Phenolic Compounds	Effluent Flow, Temperature, pH, TSS, TDS

¹ Industry using chromium in its cooling water system will also report Chromium (trivalent, hexavalent) in addition to the stipulated priority parameters for each sector.

² Priority parameters will be limited to those occurring in chemicals and raw materials used.

³ Steel Industry includes steel re-rolling mills, electric furnaces, and foundries.

Table - B : Priority Parameters for Monitoring of Liquid Effluents: Category - B

S. No.	Industry	Priority Parameters for Normal Plant Conditions to be Reported on a Quarterly Basis ¹
1.	Dairy Industry	Effluent Flow, Temperature, pH, BOD ₅ , COD, TSS, TDS, Oil & Grease
2.	Fruit and Vegetable Processing	Effluent Flow, Temperature, pH, BOD ₅ , COD, TSS,
3.	Glass Manufacturing	Effluent Flow, Temperature, pH, COD, TSS, Oil & Grease
4.	Sugar	Effluent Flow, Temperature, pH, BOD ₅ , COD, TSS, Oil & Grease
5.	Detergent	pH, COD, Oil & Grease, An-ionic Detergent
6.	Photographic	pH, COD, Silver, Cyanide, Fluoride
7.	Glue Manufacture	BOD ₅ , COD, pH
8.	Oil & Gas Exploration	Effluent Flow, Temperature, pH, COD, TSS, TDS, Oil & Grease, Chloride, BOD ₅ , Phenolic, Compounds
9.	Thermal Power Plants (Gas Fired)	Effluent Flow, Temperature, pH, TSS, Oil & Grease
10.	Vegetable Oil & Ghee Mills	Effluent Flow, Temperature, pH, BOD ₅ , COD, TSS, Oil & Grease
11.	Woolen Mills	Effluent Flow, Temperature, pH, BOD ₅ , COD, TSS, TDS, Chromium, Oil & Grease
12.	Plastic Materials and Products	TSS
13.	Wood and Cork Products	pH, TSS, COD, Phenolic, Compounds

¹ Industry using chromium in its cooling water system will also report chromium (trivalent, hexavalent) in addition to the stipulated priority parameters for each sector.

Table - C : Priority Parameters for Monitoring of Liquid Effluents: Category - C

S. No.	Industry	Priority Parameters for Normal Plant Conditions to be Reported on a Biannual Basis ¹
1.	Pharmaceutical (formulation) industry, marble crushing, Cement, and any other industry as notified by EPAs	Effluent Flow, Temperature, pH, COD, TSS, TDS

¹ Industry using chromium in its cooling water system will also report chromium (trivalent, hexavalent) in addition to the stipulated priority parameters for each sector.

Table - D : Priority Parameters for Monitoring of Gaseous Emissions

S. No.	Emission Source	Priority Parameters ¹ for Reporting
1.	Boiler, Ovens, Furnaces and Kilns Gas Fired	CO, NOx
	Oil Fired	CO, NOx, SOx, Particulates
	Coal	CO, NOx, SOx, Particulates
	Bagasse and Firewood	CO, Particulates
2.	Brick Kilns	CO, NOx, SOx, Particulates
	Thermal Power Plants	SOx, NOx, Particulates
4.	Process Emissions ²	Particulates, Ammonia, Chlorine, H ₂ S, Fluoride, SOx, NOx, CO, Mercury ³ , Lead ³ , Zinc ³ , Cadmium, Arsenic ³ , Antimony

¹ Process emissions involving fuel combustion will also include parameters as for Boilers, Ovens, Furnaces and Kilns

² Metal analyses of all gaseous emissions would be carried out once in two years.

³ Priority parameters will be limited to those occurring in chemicals and raw-materials used

Table - E : Priority Parameters for Monitoring of Gaseous Emissions : Category - A

S. No.	Industry	Priority Parameters for Normal Plant Conditions to be Reported on a Monthly Basis	
		Process Emission	Emission from Fired Equipment
1.	Cement	Particulates	CO, *SOx, NOx, Particulates
2.	Glass Manufacturing	Particulates	CO, *SOx, NOx, Particulates
3.	Iron and Steel	Particulates, Fluorides, CO, NOx, SOx	
4.	Nitrogenous Fertilizers	Ammonia, Particulates	CO, *SOx, NOx, Particulates
5.	Phosphate Fertilizers	Ammonia, Fluoride Particulates	
6.	Oil & Gas Production	CO, *SOx, NOx, H ₂ S, Particulates	
7.	Petroleum Refining	H ₂ S, NOx, SOx, Particulates	CO, *SOx, NOx, Particulates
8.	Pulp and Paper	Chlorine, SOx	CO, *SOx, NOx, Particulates
9.	Thermal Power Plants (Coal and Oil based)		*SOx, NOx, CO, Heavy Metals and Particulates
10.	Boilers, Ovens, Furnaces and Kilns (Coal and Oil fired)		CO, NOx, *SOx, Particulates
11.	Brick Kilns (Firewood and Bagasse)		CO, Particulates

¹ Metal analyses of all gaseous emission would be carried out once in two years.

* Only where fuel contains hydrogen sulphide (H₂S) more than 20 ppm.

Table - F : Priority Parameters for Monitoring of Gaseous Emissions : Category - B

S. No.	Industry	Priority Parameters for Normal Plant Conditions to be Reported on a Quarterly Basis	
		Process Emission	Emission from Fired Equipment
1.	Sugar	Particulates	CO, SO _x , NO _x , Particulates
2.	Textile		CO, SO _x , NO _x , Particulates
3	Chloralkali Plants	Chlorine	
4.	Dairy Industry		CO, NO _x , SO _x , Particulates
5	Fruits and Vegetables		CO, NO _x , SO _x , Particulates
6	Metal Finishing and Electroplating	Particulates	
7	Boilers, Ovens, Furnaces and Kiles (Gas-Fired)		CO, NO _x

- 1. Metal analyses of all gaseous emission would be carried out once in two years.
- 2. Only where fuel contains hydrogen sulphide (H₂S) more than 20 ppm.

Environmental Monitoring Report, Cover Sheet

Reference No :		Date :	
Company Name :			
Address :			
Telephone :		Fax :	
Reporting Period :	From :	To :	
Total Production During the Reporting Period (kg/tons) :			
Total Start-up and Plant Upset Duration (Hours) :		Total Normal Operating Days :	
Name and Address of the Environmental Laboratory :			
Prepared By :		Reported By :	

Liquid Effluents Monitoring Report

Name of the Industry: Pulp and Paper (Example)		Reporting Period			
Stream Identification	NEQS	Effluent Stream 1		Effluent Stream 2	
		Under N.P.C.	Deviation from NEQS	Under N.P.C.	Deviation from NEQS
Date Sampled					
Effluent Flow (m ³ /day)					
Temperature	40 (°C)				
pH	6 - 10				
BOD ₅	80 mg/l.				
COD	150 mg/l.				
TSS	150 mg/l.				
TDS	3,500 mg/l.				
Sulfides	1 mg/l.				

Gaseous Emissions Monitoring Report

Name of Industry: Cement (Example)		Reporting Period:			
Parameters	NEQS	Stack 1 N.P.C.	Stack 1 Deviation from NEQS	Stack 2 N.P.C.	Stack 2 Deviation from NEQS
Stack Identification					
Date Sampled					
Fuel Used					
Carbon Monoxide (CO)	800 mg/Nm ³				
Oxides of Nitrogen (NOx)	400 mg/Nm ³				
Sulfur Oxides (SOx)	400 mg/Nm ³				
Particulates	300 mg/Nm ³				

Note: Fugitive emissions or leaks to be detected and controlled.
 N.P.C. = Normal Plant Condition

ANNEXURE-X

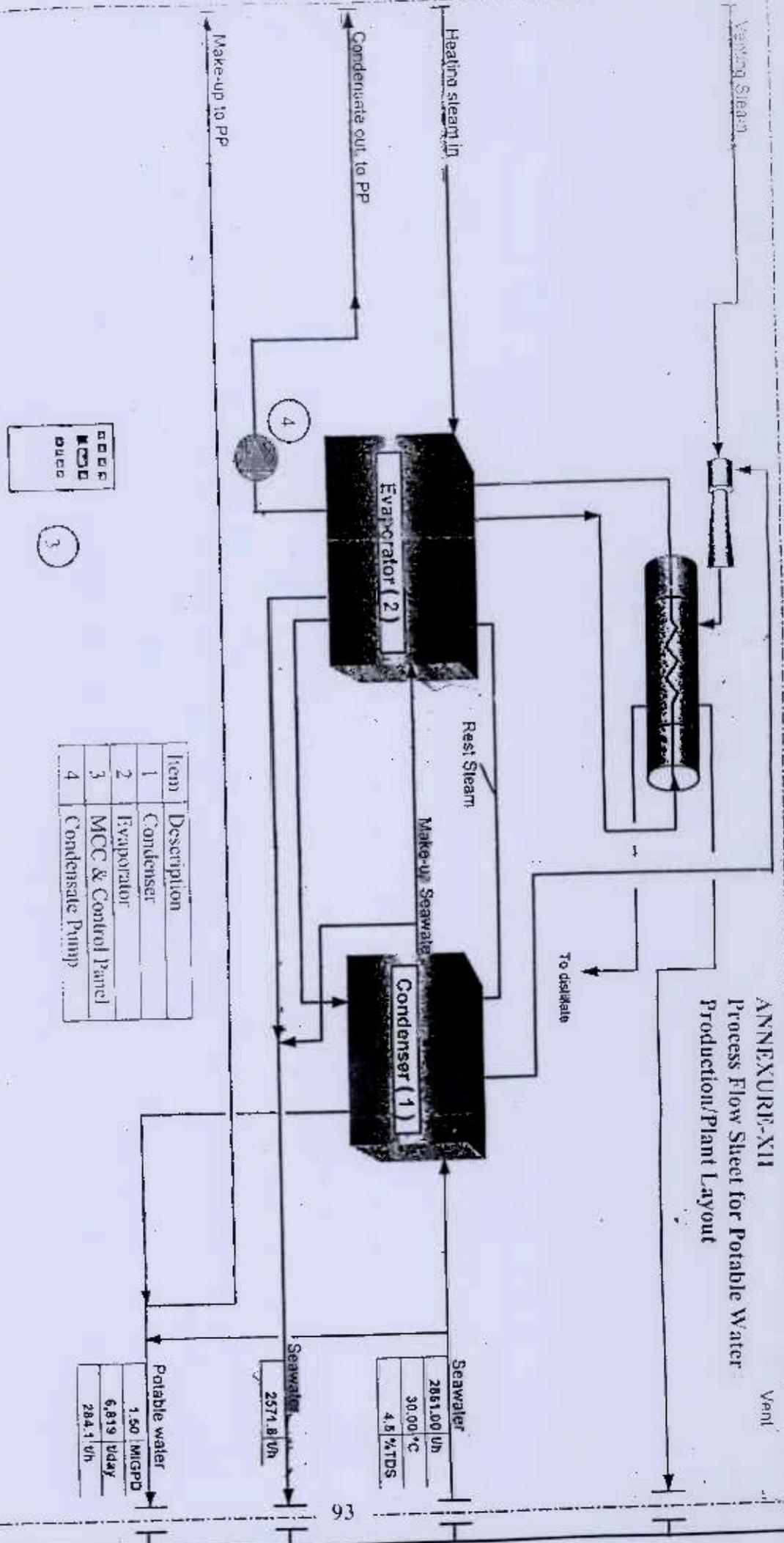
List of Major Equipments**1. Power Plant**

- i. Gas Turbine Set:
 - Gas Turbine
 - Electrical Auxiliaries
 - Air Intake Systems
 - Exhaust Gas Streams
 - Gas Detection Systems
- ii. Heat Recovery Steam Generator:
 - High Pressure Steam System
 - Low Pressure Steam System
- iii. Steam Turbine:
 - Steam Turbine
 - Gearbox
 - Clutches
 - Base Frame
 - Accessories
- iv. Balance of Plant:
 - Water Distribution System
 - Steam/Water System
 - Cooling Water System
 - Fire Water System
- v. Electrical Systems:
 - Generator Circuit Breaker
 - Transformers
 - MV and LV Switchgears
 - Measuring and Metering
 - Synchronizing
 - Cabling
 - Telephone Systems
- vi. Control and Instrumentation Systems:
 - Operation Station
 - Monitors and Printers
 - Control Room Equipments
 - Level Measurements
 - Flow Measurements

2. Portable Water Plant

- i- Condensers
- ii- Evaporates
- iii- Vacuum Systems
- iv- Distillate Pumps
- v- Makeup Filters
- vi- Anti-Scalant Dosing Unit
- vii- MCC and Control Panel

ANNEXURE-XII
Process Flow Sheet for Potable Water
Production/Plant Layout



Item	Description
1	Condenser
2	Evaporator
3	MCC & Control Panel
4	Condensate Pump

Seawater
2861.00 t/h
30.00 °C
4.5 %TDS

Potable water
1.50 M/GPD
6,819 l/day
284.1 t/h

Project: DCL, Pakistan

PHOTO LOGS



Different Views of the Plant Site



Base Line Environmental Monitoring on Plant Site



Base Line Environmental Monitoring on Plant Site

1



2



3



**Base Line Environmental Monitoring on Plant Site (1 , 2)
&
Plant Site Adjoining Land Being Used for Municipal Solid Waste Burning (3)**