THE ECONOMIC BUREAU

المكتب الاقتصادي

JAPAN INTERNATIONAL COOPERATION AGENCY

AIR POLLUTION CONTROL, MONITORING, ANALYSIS AND TREATMENT

A SECTOR PROFILE

Prepared By:
The Economic Bureau

May 1999

مبنى مؤسسة الملك فيصل الخيرية - ص.ب ٨٦٦١٩ الرياض ١١٦٣٢ - ترخيص رقم ٨٨ - هاتف ٤٦٤ ٨٢٩٥ / ٤٦٤ ٣٩٣٨ - فاكس ٤٦٥ ٤٦٦٩ - المملكة العربية السعودية
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GENERAL DESCRIPTION

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In the last ten to fifteen years, the Saudi government has made rapid progress towards meeting the high environmental goals established by the world community as represented by the international organizations. The Saudi government has found it necessary to include environmental considerations as part of its development objectives and strategies.

The Saudi Government's concern about the environment was explicitly stated in the country's Sixth Development Plan (1995-2000). In addition, in recent years. the Saudi Government has reinforced its environmental efforts by participating in international conferences and signing international agreements to promote a cleaner environment. A major source of air pollution in Saudi Arabia is the transportation sector. Motor vehicles emit nitrogen dioxide and volatile organic compounds. which, in the presence of sunlight, convert low-level ozone into smog.

While there is a general shortage of environmental information and data at the national level, it is widely acknowledged that rapid development of the Kingdom. particularly in urban areas. has been accompanied by a deterioration of air quality as a direct consequence of massive increase in land transportation (cars, trucks and buses) and associated growth in emission of air pollutants. In addition to these mobile sources of air pollution, there has been growth in stationary sources of air pollution, such as factories, desalination plants, power stations and oil refineries. Air pollutants generated by these sources depend on quality and mix of fuel used and its efficiency, as well as level of technology, design efficiency and operating cycles.

The Government has ordered major industrial projects to conform to international air standards, in order to limit emissions, but there has been little in way of

monitoring and enforcement. With the ban on production and use of halons (Saudi Arabia is a signatory to the Montreal Protocol), the Government encourages environmental agencies and the private sector to participate in protecting the environment by not releasing halons, which deplete the ozone layer. The USECO Halon Recycling Factory in Dammam was the first factory established in the Middle East to recover, condition and recycle halon gases.

There are only three air monitoring stations in the country, one at each of the three international airports. Air monitoring is practically non-existent. For example, readings at the Riyadh station do not reflect air quality in the city since the station is located 35 km away. Monitoring quality of air in and around Riyadh would require at least five monitoring stations, two of them mobile.

The Saudi government considers that it is necessary to increase the number of air quality monitoring stations in urban areas, particularly in densely populated areas, and to study the best methods of controlling pollutants from stationary sources. With respect to motor vehicles, government considers there is an urgent need to switch to lead-free fuel and to adopt a plan for use of catalytic converters, in addition to improved systems for managing traffic flows. Equally important to reducing the hazards of air pollution is to increase vegetational cover, green belts and forestry plantation.

Slowly but steadily, Saudi Arabia is beginning to tackle its environmental pollution problems. Environmental concerns are incorporated in the Kingdom's Sixth Development Plan (1995-2000), which allocates nearly $260 million for environmental protection and pollution control over the plan period. In addition, the government has been participating in international conferences on the subject and has signed international agreements to promote a cleaner environment. In a move to intensify cooperative efforts to fight pollution, Saudi Arabia is working to phase out chlorofluorocarbons (CFCs) and other harmful chemicals within a 10-year period. To this end, a project has been launched in cooperation with the

private sector and Saudi government to create conditions conducive to phase out CFCs.

The country still has a long way to go, however. The transportation sector is a major source of air pollution in the Kingdom, and while the government has announced plans to produce lead-free gasoline, it has so far established no timetable. Desalination plants continue to account for a major part of the sulfur dioxide and nitrogen oxide released into the air from fixed sources, with the plume from the Jeddah plant hovering directly over residential areas and several government facilities, including a hospital. And Jeddah's industrial city is responsible for significant amounts of airborne pollution, as are the city's refineries and the King Abdul-Aziz International Airport.

The government has established environmental protection agencies and ordered that all major industrial projects conform to international air standards to limit emissions, but it does little in the way of monitoring and enforcement. Because of a lack of technically qualified personnel, laboratory facilities and equipment to monitor pollution, and enforcement mechanisms, compliance with environmental regulations in the country is low.

Section 2

RESPONSIBLE AGENCIES

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RESPONSIBLE AGENCIES

METEOROLOGY AND ENVIRONMENTAL PROTECTION ADMINISTRATION (MEPA)

In 1981, the government established the **Meteorology and Environmental Protection Administration (MEPA)** designated as the central government agency for the environment, in addition to its functions in the field of meteorological services. In particular, the following functions were assigned to **MEPA**:

- Conduct environmental surveys to define problems and recommend environmental standards and measures;
- Recommend protection regulations and measures dealing with environmental problems;
- Recommend practical measures necessary to deal with emergency situations affecting the environment;
- Assess existing environmental pollution levels and future variations;
- Keep abreast of developments in the field of environmental protection on regional and international levels; and
- Establish environmental standards and specifications for pollution control and environmental protection, in a definite and stable form to be considered by appropriate authorities when issuing permits for industrial and agricultural projects, which may have an environmental impact.

In response to increasing interest in environmental concerns at the national level. the **Ministerial Committee on the Environment (MCE)** was formed in 1990 to act as the highest institutional authority responsible for setting environmental strategies and policies at national level, in addition to determining the Kingdom's international and national viewpoints in this field. **MEPA** was assigned to undertake the tasks of General Secretariat of **MCE** and still play its role in daily operations of environmental management and in coordinating such matters at the national level.

Major achievements at the national level in this field during the last few years can be summarized as follows:

- Development of environmental management institutions and a national framework for managing the environment. culminating in formation of the Ministerial Committee on the Environment and its general secretariat in 1410:

- The Kingdom's effective participation in many international and regional forums on environmental issues, in particular the United Nations Conference on Environment and Development (the "Earth Summit") held in Rio de Janeiro. Brazil in 1992;

- Establishment of the Saudi Environmental Awareness project in cooperation with **MEPA** and the private sector through the Economic Offset Program: under this scheme -- a pioneer of its type in cooperation between government and private sector -- the private sector provided management and finance. while **MEPA** provided necessary scientific and technical support;

- Development and upgrading of meteorological services to both civilian and non-civilian sectors:

- Conservation and expansion of the Kingdom's vegetational resources, through activities of Ministry of Agriculture and Water, including plantation of more than 10,000 hectares of range and pasture lands, re-plantation of 80 hectares of forests, and distribution of 500,000 seedlings; in addition, the Ministry surveyed and classified 200,000 hectares of land and continued maintenance and development of irrigation and drainage networks;

- Attention to environmental affairs by a number of agencies and organizations in the industrial sectors, such agencies and organizations include the Ministry of Petroleum and Mineral Resources, the Ministry of Industry and Electricity, Saudi ARAMCO, the Royal Commission for Jubail and Yanbu plus SABIC.

THE ROYAL COMMISSION FOR JUBAIL AND YANBU

The Royal Commission for Jubail and Yanbu signed a memorandum of understanding with MEPA whereby the Commission became responsible for developing and adopting regulations, standards and guidelines to control substances emitted, discharged, or deposited, and noise generated within Jubail and Yanbu industrial cities. The Commission operates an extensive array of air quality monitoring stations and conducts surveillance monitoring to determine compliance with Environmental Standards; this includes ambient air quality as well as discharges to the atmosphere. Industries' self-monitoring data as well as the Royal Commission's own ambient and source monitoring programs are the basis for enforcement.

The Commission requires all applicants to submit an environmental impact assessment report. The Commission reviews this report and only upon approval is the environmental permit to operate issued.

ARAMCO

Aramco also is involved in monitoring its extensive operations as well as periodic survey of areas near its operations in the Gulf.

SAUDI ARABIAN STANDARDS ORGANIZATION (SASO)

Maximum permissible vehicle emissions from carbon monoxide, hydrocarbons and nitrogen oxides have been regulated by SASO. Since the start of motor vehicle inspection tests in the Kingdom. emissions are regularly checked on an annual basis.

Section 3

PRIORITY OF GOVERNMENT FOR PRIVATIZATION

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The Sixth Development Plan (1995-2000) stipulates that the private sector is in a position to make significant contribution to the goal of long-term sustainable development through engaging in the following activities (among others):

- Establishment of non-profit organizations with aim of managing and financing environmental awareness programs;

- Production of environment-friendly goods for which demand is proven on the international market

- Engaging in environmental consulting activities directed at both the private and public sectors. This includes preparation of environmental assessment reports for various government and private sectors. It is worth noting such assessment reports are often required for issuance of licenses for industrial projects: and

- Development of national parks. recreational activities and resorts (under the assumption that these will include reasonable vegetational cover/ forestry plantation).

Although the Sixth Development Plan does mention need to increase the number of air quality monitoring stations, it does not suggest possible privatization of air monitoring activities. It is however reasonable to expect a certain openness (and positive predisposition) from concerned government agencies to look into genuine proposals from the private sector.

Section 4

CURRENT ACTIVITY, RELATIVE GROWTH AND SAUDIZATION

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CURRENT ACTIVITY, RELATIVE GROWTH AND SAUDIZATION

Increased awareness of the environment will impel the Saudi Government to draft regulations and impose controls on sources of pollution. Currently, there are no laws that restrict pollution levels and provide solutions. Nonetheless, some quasi-governmental agencies have adopted a number of international standards to manage pollution levels within their jurisdiction. The Saudi Government is expected to implement a national environmental plan once draft standards and implementing regulations are finalized. Therefore, while the market for pollution control equipment is limited now, future prospects for it are much brighter.

By world standards, the Kingdom has made great strides in its urban and social development as a modern economy, and has built a solid industrial infrastructure that is gradually shifting away from total dependence on oil production. Interest in pollution control and environmental protection is expected to follow this growth in line with strong global attention accorded to the issue. By world standards, however, Saudi Arabia is still not a major industrial country, and concerns about the environment are not high priorities except in certain regions.

Gradual erosion and contamination of natural resources and the pollution created by various processes are coming to be viewed as national problems. Moreover, there is no major grassroots support for better controls at this time, and little information exists about the level and types of pollution in Saudi Arabia. A few of these problems are described below:

As stated earlier, air monitoring is almost non-existent in Saudi Arabia. There are three air-monitoring stations located at each of the three international airports. The station located at the Riyadh airport does not reflect air quality in the city, as it is located 35 km away from the city, and at least five monitoring stations, two of them mobile, are necessary to monitor the air quality in and around Riyadh. The

ultimate goal of the Saudi Government is to sustain economic progress and development without further compromising the environment. MEPA & MCE coordinate. regulate, and monitor all aspects of the environment and pollution levels. In 1982, MEPA promulgated its first environmental protection standard on air pollution.

At present, there are no national regulations governing the emission of pollutants. although MEPA has issued draft regulations that will lead to a national waste disposal code. MEPA provides meteorological services for marine and air navigation activities, oil drilling platforms, agriculture and the general public. It has also been involved in establishment of standards with respect to use of lead free fuel (which may be available in Saudi Arabia in the year 2000), control of dust in cement factories and quarries, oil spill control and air quality monitoring. Other government agencies are also involved in environmental protection. including the Ministry of Agriculture and Water, the Royal Commission for Jubail and Yanbu. the Ministry of Municipal and Rural Affairs (MOMRA), Arriyadh Development Authority (ADA). and the King Abdul Aziz City for Science and Technology (KACST), among others.

The national oil company, Saudi Aramco, and the Royal Commission of Jubail and Yanbu are the most effective agencies in terms of minimizing and controlling pollution in this market. In the early design and planning stages of the two industrial cities at Jubail and Yanbu, the Royal Commission outlined a number of requirements to keep and maintain a cleaner environment at the two cities. Among other things, the Royal Commission:

- Performs environmental impact assessments to predict effects of rapid industrialization;

- Develops regulations to restrain industrial air emissions and effluent discharges to acceptable world levels;

- Uses environmental design criteria at Jubail and Yanbu consistent with the New Source Performance Standards of the U.S. EPA:

- Encourages industries to monitor stack gases with automated process controls in order to reduce total plant emissions;

- Requires new industries relocating to Jubail or Yanbu to perform remedial engineering and construction to ensure that environmental safety and proper pollution control equipment are included in the plant design; and:

- Requires continuous field inspection of facilities to ensure compliance with environmental regulations.

In addition to the above, the Royal Commission has implemented a comprehensive program to monitor ambient air quality, industrial effluent, and ground water in the cities of Jubail and Yanbu. Elements of this program include monitoring stations, water sampling, landfill management and noise monitoring.

Originally created as an independent agency to plan development of Riyadh, the Arriyadh Development Authority (ADA) focuses its efforts on preserving the ecosystem in the Riyadh area, and is currently developing environmental standards for the city of Riyadh which could be adopted for the Kingdom as a whole. ADA presented the Saudi Government's stance at a major international environmental conference held in Riyadh during September 1997.

The Saudi Government accords environmental protection and pollution control in the Sixth Development Plan (1995-2000). Close to $260 million will be allocated to protect the environment and control pollution over the lifespan of the Sixth Plan.

There is also increased environmental awareness in the private sector. Many industries. especially large plants, have started installing air pollution control equipment.

In spite of overall achievement and growth of Environmental sector as a whole. little is being accomplished about air pollution control and monitoring. Government has stressed some key issues and seeks to cooperate and coordinate in development of more indicators: environmental information and data, waste management, air quality, fresh water resources, management of land use and combating desertifications. management of coastal and marine areas.

It is necessary, therefore. to increase the number of air quality monitoring stations in urban areas, particularly in densely populated areas. and to study the best methods of controlling pollutants for stationary sources.

As far as Saudization is concerned, Saudi nationals accounted for 94 percent of all employees at MEPA by the end of the Fifth Plan. Management positions are filled entirely by Saudis, while Saudis make up 87.7 percent of professional positions. During the Sixth Plan, MEPA will meet its manpower needs through placement of Saudis in all vacant posts. The overall Saudization rate is expected to rise to 97.5 percent, while the percentage of professional positions filled by Saudis is expected to increase to 95 percent.

As for NCWCD, the percentage of Saudis reached 91.7 percent by the end of Fifth Plan. Saudis occupied all management positions and 91.7 percent of professional positions. During the Sixth Plan, NCWCD's overall Saudization rate is expected to rise to 95 percent.

Section 5

REGULATIONS AND ADMINISTRATIVE SYSTEM

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The Kingdom participated in several international and regional forums on environmental issues, such as the United Nations Conference on Environment and Development (the Earth Summit) that was held in Brazil in 1992. There have also been numerous seminars held recently around the Kingdom hosted by high-level public figures. Such high-level attention to the environment was virtually unheard of several years ago. An environmental conference took place in September 1997 under the leadership of Prince Sultan, Second Deputy Premier and Minister of Defense and Aviation.

The government has ordered major industrial projects to conform with international air standards in order to limit emissions, but there has been little in the way of monitoring and enforcement.

With the ban on production and use of halons, the government encourages environmental agencies and the private sector to participate in protecting the environment by not releasing halons which deplete the ozone layer. USECO Halon Factory in Dammam was the first factory established in the Middle East to recover, condition and recycle Halon gases.

Offices concerned with development of environmental policies include:

1. Meteorology and Environmental Protection Administration (MEPA)
   P. O. Box 1358, Jeddah 21431, Saudi Arabia
   Tel: 966-2- 651-2312, Fax: 966-2-651-1424
   Contact: Dr. Abdulbar A. Al-Gain, President and Secretary General

2. Ministry of Municipal and Rural Affairs (MOMRA)
Department of Environmental Health
Riyadh 11136, Saudi Arabia
Tel: 966-1-442-1593/ Fax. 966-1-441-6748
Contact: Mr. Mohammad Al-Issa. Director General

3. Royal Commission for Jubail & Yanbu
P.O. Box 5964, Riyadh 11432, Saudi Arabia
Tel: 966-1-479-4445/Fax: 966-1-477-5404
Contact: Dr. Omar Abdul Kareem, Assistant Chairman

4. King Abdul Aziz City for Science and Technology (KACST)
Research Institute on Environment and Natural Resources
P. O. Box 6086. Riyadh 11442. Saudi Arabia
Tel: 966-1- 488-3444/3555/ Fax: 966-1- 488-3756
Contact: Dr. Mustapha Ali Al-Dughaither. Director

5. Arriyadh Development Authority (ADA)
P.O. Box 94501
Riyadh 11614, Saudi Arabia
Tel: 966-1-488-3331/fax: 966-1-482-6753
Contact: Eng. Abdul Latif Al-Sheikh. Director General

6. Saline Water Conversion Corporation (SWCC)
Research & Technical Affairs Department
P.O. Box. 60889. Riyadh 11555, Saudi Arabia
Tel: 966-1-465-0836/463-3124/ Fax: 966-1-465-0852
Contact: Eng. Abdullah Al-Azzaz
Director General for Research & Development

7. Riyadh Water & Sewage Authority
Operation and Maintenance Program
P.O. Box. 22155, Riyadh 11495, Saudi Arabia
Tel: 966-1-401-2279,/Fax: 966-1-404-0316
Contact: Eng. Muwafaq Al-Sugair, General Manager. Project Department

8. Saudi Arabian Standards Organization (SASO)
Standards General Department
P.O. Box 3437
Riyadh 1147, Saudi Arabia
Tel : 966-1-452-000 / Fax : 966-1-452-0086
Contact: Seraj Moh'd Masoudi

Major air pollution impact of industry is the emission of particles and gases into the atmosphere. Of especial concern is the emission of greenhouse gases which increase the atmospheric blocking of heat transfer from the earth into space, and so contribute to global warming; gases which destroy ozone. the major atmospheric protection from damaging short-wave radiation from the sun, are another major area of concern.

The emission of chlorofluorocarbons (CFC's), which are powerful greenhouse gases as well as ozone destroyers, is largely related to per capita demand for air conditioning and refrigeration. As industrial development is always associated with environmental side-effects, such as consumption of natural resources, air pollution, emissions, industrial waste, etc., the Kingdom of Saudi Arabia has recognized the need to set specific policies and objectives for environmental protection closely related to its industrialization program. The government regulations and policies relating to air quality and general environmental standards are placed at **Appendix-A & B** at the end of this Profile.

Section 6

MARKET FOR POLLUTION CONTROL / ENVIRONMENTAL EQUIPMENT

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MARKET FOR POLLUTION CONTROL / ENVIRONMENTAL EQUIPMENT

The Saudi market for pollution equipment is divided into three general groups: local manufacturers, governmental projects and private sector. Government purchases account for 25 percent of the total market and procurement, usually inviting major local dealers to provide quotations. Other government establishments make their procurement decisions depending on types and models of equipment used. The two government entities that oversee and regulate Saudi Arabia's environmental protection sector are MEPA and the Environmental Protection Coordination Commission (EPCC). MEPA and EPCC were both established in 1981 to coordinate, regulate and monitor all aspects of the environment and to measure pollution levels. MEPA plays a major role in the daily operations of environmental management and in coordinating environmental and pollution matters at the national level. MEPA also reviews all new environmental projects referred by the Ministry of Industry and Electricity on behalf of Saudi companies seeking to establish industrial projects. MEPA currently has international environmental experts as advisors. The Saudi Government is considering splitting off meteorology and environmental protection into two separate agencies.

The market demand for environmental equipment in Saudi Arabia is expected to grow by more than 7 percent over the next few years due to increased levels of pollution caused by industrialization and urban growth. There is no local industry for any environmental equipment in the Kingdom except for wastewater treatment plants, membrane manufacturing and some solid waste compacting.

The government has announced a number of measures including zero import tariffs and other incentives such as long-term, low interest loans, lower land

prices, and subsidized utility prices for industries investing in environmental projects.

The Saudi market for pollution control equipment is almost totally dependent on imports, except for one local factory, Saudi Industries for Desalination Membranes and Systems Ltd. (SIDMAS), which is the only company approved for production of Film Tec reverse osmosis elements under license from Dow Chemical. Local firms still lack the know-how and expertise in specialized areas of pollution control such as hazardous waste. marine, oil spills and air pollution. Although Japanese companies are well placed to supply these requirements, they face increased competition from European and American companies. Danish, Swiss. German. and Japanese companies are gaining market share in the Saudi industrial sector. where waste and air emissions have seen extraordinary growth in the last few years. Danish companies top the list of third-country suppliers to the Saudi market. accounting for almost 13 percent of imported pollution control equipment. followed by the Japanese at 10 percent, British companies at nearly 9 percent and German firms at less than 8 percent.

Widely recognized as world leaders for environmental equipment and services. U.S. suppliers have consistently provided durable. state-of-the-art technology and better financing terms. Above all, pricing considerations have enabled U.S. companies to be competitive in the Saudi market. American companies spearheaded development of waste management codes and guidelines for major urban centers of the Kingdom working under contract with various ministries and government agencies. Most of these companies were involved in joint ventures with local Saudi companies, which acquired invaluable experience in maintaining quality control measures and adapting to new measures and equipment in the process. A majority of companies currently involved in urban and industrial waste management are Saudis with little foreign participation except in specialized areas. However, American joint ventures have created receptiveness to a wide range of American pollution control equipment, waste collection machinery, and waste treatment equipment.

Section 7

PRIVATE COMPANIES INVOLVED IN AIR POLLUTION CONTROL AND ENVIRONMENTAL TECHNOLOGY BUSINESS

Section 7

PRIVATE COMPANIES INVOLVED IN AIR POLLUTION CONTROL AND ENVIRONMENTAL TECHNOLOGY BUSINESS

END-USERS AND DISTRIBUTORS

METITO Arabia Industries Ltd.
P.O. Box 6133, Riyadh 11442, Saudi Arabia
Tel: 966-1-479-4250/Fax: 966-1-479-4250
Contact: Eng. Samih Nasr, Vice President, Material Control

Koob Agriculture Est.
P.O. Box 4832, Riyadh 11412, Saudi Arabia
Tel: 966-1-462-0068/464-1689/465-1461/Fax: 966-1-465-0355
Contact: Mohammed Al-Hassan, General Manager

Saleh & Abdul Aziz Abhsain Co. Ltd., Commercial Division
P.O. Box 42127, Riyadh 11541, Saudi Arabia
Tel: 966-1-4474-2536/Fax: 966-1-476-2660
Contact: Mr. Mirza Shahzad, Sales Manager

Miras Trading Est.
Waterworks
P.O. Box 21388, Riyadh 11485, Saudi Arabia
Tel: 966-1-476-6810/Fax: 966-1-478-9483
Contact: Mr. Maher M. Othman, General Manager

Al-Murjan Environmental Management & Technology Co. Ltd.
P.O. Box 51238, Jeddah 21543, Saudi Arabia
Tel: 966-2-669-3500/Fax: 966-2-661-2849
Contact: Dr. Aziz Hussain, Business Development Manager

El-Seif Development Co.

P.O. Box 3775, Dammam 31481, Saudi Arabia

Tel: 966-3-894-1502/898-5594/Fax: 966-3-864-4359

Contact: Mr. Salem Daiban, Sales & Marketing Manager

Trans Oceans Agencies Ltd.

P.O. Box 4715, Dammam 31412, Saudi Arabia

Tel: 966-3-826-7270/Fax: 966-3-827-6367

Contact: Mr. Khalid Abu Zaid, Sales & Marketing Manager

Environment Friendship Group

SKAB's Group Companies

P.O. Box 13271, Jeddah 21493, Saudi Arabia

Tel: 966-2-683-0711/685-4375/Fax: 966-2-682-8402

Contact: Mr. Mohammed I. Alawi, Jeddah Project Manager

Rashid Geotechnical & Materials Engineers

P.O. Box 15833, Riyadh 11454

Tel: 966-1-477-3601/Fax: 478-4558/476-9379

Contact: Mr. Joaquim Rodrigues, Operations & Business Development Manager

Otaco Environmental

P.O. Box 1886, Al-Khobar 31952, Saudi Arabia

Tel: 966-3-864-9554/894-7311/894-7307/Fax: 966-3-898-5368

Contact: Dr. Mohammed Ghaneyen, General Manager

Saudi Arabian Bechtel Company
Jubail Project
PO Box 10011, Jubail 31961, Saudi Arabia
Tel: 966-3-341-4226/Fax: 966-3-341-7184
Contact: N.H. Shotwell, Program Manager

Tharban Trading Co. Ltd.
P.O. Box 51819, Riyadh 11553, Saudi Arabia
Tel: 966-1-401-0111 Ext. 220/Fax: 966-1-401-1217
Contact: Mr. Sami Jaber, Sales Manager

Kaid Al-Injaz International
P.O. Box 30509, Al-Khobar 31952. Saudi Arabia
Tel: 966-3-894-8684/Fax: 966-23-898-1965
Contact: Kamel Al-Johani, General Manager

Hazar Establishment for Trading
P.O. Box 41699, Riyadh 11531, Saudi Arabia
Tel: 966-1-464-2068/Fax: 966-1-464-4190
Contact: Mohammed El-Badawy, General Manager

Al-Othman Trading & Contracting Co.
P.O. Box 1783, Dammam 31441, Saudi Arabia
Tel: 966-3-833-1197/833-1293/Fax: 966-3-833-0619
Contact: Adel H. Ali, General Manager

Al-Muhandis Nizar Kurdi
P.O. Box 2962, Riyadh 11461
Tel: 966-1-476-5558/Fax: 966-1-478-4186
Contact: Eng. Ameer Ahmed, General Manager

Mawarid Services Group

P.O. Box 1011, Riyadh 11431

Tel: 966-1-477-8755/Fax: 966-1-478-0877

Contact: Dr. Ahmed Saleh Al-Twaijri, Managing Director

Al-Jol Contracting & Trading Co.

P.O. Box 86, Al-Khobar 31952, Saudi Arabia

Tel: 966-3-898-5545/895-1254/Fax: 966-3-898-6009

Contact: Wassim R. Naamani, General Manager

A. K. H. Al-Sinan & Partner

P.O. Box 374, Al-Jubail 31951, Saudi Arabia

Tel: 966-1-361-4886/Fax: 966-1-361-39939

Contact: A.K. H. Sinan, General Manager

Dallah Al-Baraka Group

P.O. Box 6854, Jeddah 21452, Saudi Arabia

Tel: 966-2-671-0000 Ext: 3386/ Fax: 966-2-669-4264

Contact: Dr. Abdul Razzak Kamel, Advisor to the Chairman

Saudi Aramco

P.O. Box 5000, Dhahran 31311, Saudi Arabia

Tel: 966-3-877-0110/874-4941, Fax: 966-3-873-8190/874-4628

Contact: Muhsen Fahad Al-Ajmi, Chief Environmental Engineer

Dakkak Trading Group

P.O. Box 5221, Jeddah 21422, Saudi Arabia

Tel: 966-2-660-1142/660-1209, Fax: 966-2-660-9295

Contact: Abdul Samea Abdul Ghani, Commercial Manager

Al-Fahhad Zegwaard Company
P.O. Box 4537, Dammam 31412, Saudi Arabia
Tel: 966-3-842-0244/842-1294, Fax: 966-3-842-1248
Contact: Frank Van Kooten, General Manager

Saudi Oil Services Co.
P.O. Box 30763, Al-Khobar 31952, Saudi Arabia
Tel: 966-3-895-0703, Fax: 966-3-895-0703
Contact: Shehab Al-Madani, Branch Manager

Imad Company
P.O. Box 677, Al-Khobar 31952, Saudi Arabia
Tel: 966-3-864-7562/894-2169, Fax: 966-3-864-3887
Contact: Azhar Farooqi, Commercial Manager

Environmental Services Co.
P.O. Box 25, Dammam 31411, Saudi Arabia
Tel: 966-3-833-2635, Fax: 966-3-834-6206
Contact: Mohammed Ghanayem, General Manager

Damath Company Ltd.
P.O. Box 8454, Dammam 31482, Saudi Arabia
Tel: 966-3-834-4503, Fax: 966-3-833-9639
Contact: Saad H. Al-Dossary, Business Development Manager

Middle East Trading Est.
P.O. Box 142, Al-Khobar 31952, Saudi Arabia
Tel: 966-3-899-3586, Fax: 966-3-864-5625
Contact: George Baradhie, Commercial Manager

Globe Marine Services Co.
P.O. Box 1814, Dammam 31441, Saudi Arabia
Tel: 966-3-826-3655, Fax: 966-3-826-7010
Contact: Ehsan Abdul-Jawad, Deputy General Manager

Al-Afandi Est. for Trade Industry & Contracting
P.O. Box 452, Jeddah 21411, Saudi Arabia
Tel: 966-2-665-7438/660-9716/Fax: 966-2-665-7428
Contact: Mr. Ibrahim M. Afandi, General Manager

Al-Kawther Industries Ltd.
P.O. Box 7771, Jeddah 21472, Saudi Arabia
Tel: 966-2-637-0065, Fax: 966-2-637-9814
Contact: Mohammed Bafarhan, General Manager

National Environmental Preservation Co. (BEEA'H)
P.O. Box 10628, Jubail 31961, Saudi Arabia
Tel: 966-3-358-8008, Fax: 966-3-358-8584
Contact: Saad Al-Inaizi, General Manager

Osama Trading Company
P.O. Box 882, Jeddah 21421, Saudi Arabia
Tel: 966-2-642-5048/642-5423, Fax: 966-2-643-4042
Contact: Sami D. Kano, Asst. General Manager

Saudi Services & Operating Co. (SSOC)
P.O. Box 2824, Jeddah 21461, Saudi Arabia
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APPENDIX – A

AIR QUALITY REGULATIONS AND STANDARDS

3.0 ENVIRONMENTAL QUALITY REGULATIONS AND STANDARDS

Section 3.1, 3.2, and 3.3 present air quality, water quality, and noise regulations, standards, and guidelines for Madinat Yanbu Al-Sinaiyah. Sections 3.4 and 3.5 deals with solid and hazardous waste management, and special conservation areas. These regulations, standards, and guidelines are based on current information and represent criteria which are considered realistic for the city. These criteria are presented to ensure that the city's environmental goals and objectives will be successfully achieved. The regulations, standards, and guidelines are subject to change based on periodic review of new environmental data, adopting new standards from MEPA and changing circumstances within Madinat Yanbu Al-Sinaiyah.

These regulations and standards are applicable with immediate effect for any future development. A grace period of up to 5 years will be granted by the Royal Commission for existing facilities already operating in July 1992 to enable them to meet any new regulations. Each application for such a waiver will be considered on a case-to-case basis, taking into account the seriousness of the violation.

Industries which have an Environmental Permit to Operate with less than 24 months before renewal should submit their upgraded plans for compliance with their renewed application.

3.1 Air Quality Regulations and Standards

The regulations and standards presented in this section are specific to Madinat Yanbu Al-Sinaiyah and have been based on up-to-date information. The air quality regulations are intended to clearly state the environmental protection policies of Madinat Yanbu Al-Sinaiyah, and to formally define the requirements for adherence to these regulations.

Air quality standards presented in this manual fall into two categories: (1) ambient standards, and (2) source standards. Ambient standards express the desired air quality conditions, and provide the goal to be achieved through the control of air pollutant emissions. Source standards define the maximum amount of specific pollutants that any facility or operation is allowed to emit into the atmosphere from a point emission source. Source standards are set at levels which will prevent a build-up of atmospheric pollutants to harmful levels. Ambient air quality standards are generally set at levels which are determined by the threshold of observable health effects on humans.

Criteria for the establishment of the standards for air quality at Madinat Yanbu Al-Sinaiyah include:

- Climatology and meteorology data for Madinat Yanbu Al-Sinaiyah;
- Existing air quality at the city as determined by systematic sampling and analysis procedures;
- Predicted effects of the emissions on human health, plants and property of the residents of MYAS;
- Relevant air quality standards as documented for various locations around the world;
- Inventory of potential air emission sources and pollutant types within Madinat Yanbu Al-Sinaiyah;
- Air emission control points and technologies;
- Predictions of air quality for various operating scenarios through pollutant dispersion modelling; and
- MEPA standards (Document No. 1401-01, 1402H and 1409-01).

3.1.1 Air Quality Regulations

The following air quality regulations apply to new and existing facilities within Madinat Yanbu Al-Sinaiyah which emit air pollutants.

New Facilities: General Environmental Air Quality Regulations

Regulation A.Q.-1: Any person, industry, agency, or contractor designing new facilities or making modifications to existing facilities shall include in said design or modification appropriate technology to insure that the plant or facility can be operated and maintained in such a manner as to avoid exceeding the applicable ambient environmental standards and source standards promulgated for Madinat Yanbu Al-Sinaiyah at the time of final approval of the facility design or facility modification.

Regulation A.Q.-2: Any person, industry, agency, or contractor constructing new facilities or making modifications to existing facilities shall incorporate the best practical technology for control of pollutant emissions whether specifically regulated or not and shall allow for the management of accumulated wastes of said emissions associated with operation of the facility as specified at the time of design approval.

Existing Facilities: General Environmental Air Quality Regulations

Regulation A.Q.-3: Any person, firm, agency, or contractor operating and maintaining any existing facilities shall do so in such a manner as to avoid exceeding the ambient environmental standards and source standards promulgated for Madinat Yanbu Al-Sinaiyah. Additional control technology shall be required to be installed and implemented at existing facilities where necessary so as to avoid exceeding the ambient environmental standards, within an appropriate grace period.

Air Quality Regulations Specific to New Industries

Regulation A.Q.-4: Any person, firm, agency, or contractor who intends to construct a new facility shall do so in such a manner as to avoid exceeding the ambient environmental standards and source standards promulgated for Madinat Yanbu Al-Sinaiyah. Additional requirements as listed below shall be required to be installed and implemented where necessary:

I. The owner or operator of an affected facility shall provide performance testing facilities, such as a) sampling ports adequate for test methods applicable to such facility b) safe sampling platform(s) c) safe access to sampling platform(s) d) provision of utilities for sampling and testing equipment.

II. Stacks (point sources) which need to comply with the MYAS Source Standards shall also comply with the minimum stack height requirement of:

$$H_S = H + 1.5\ L$$

H_S : Good engineering practice stack height, measured from the ground-level elevation at the base of the stack.

H : Height of nearby tall structure measured from the ground- level elevation at the base of the stack.

L : Lesser dimension, height or projected width, of nearby structure(s).

Nearby means that distance up to five times the lesser of the height or the width dimension of a closest structure, but not greater than 0.8 km (1/2 mile).

Compliance with the above condition does not relieve the developer from stack-height compliance as regards ambient air quality standards.

III. The owner shall conduct the performance test of all the applicable units within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup of such facility, and furnish the Royal Commission a written report of the results of such performance test(s).

IV. The owner shall design and operate the flares with no visible emissions, except for periods not to exceed a total of 5 minutes during any two (2) consecutive hours. Flares shall be used only with the net heating value of the gas being combusted have 11.2 MJ/scm (300 BTU/scf) or greater if the flare is steam-assisted or air-assisted; or with the net heating value of the gas being combusted have 7.45 MJ/scm (200 BTU/scf) or greater if the flare is not assisted.

V. The owner shall install and operate continuous monitoring equipment for all the regulated pollutants being released from the regulated sources/stacks.

3.1.2 Ambient Air Quality Standards

Ambient air quality standards are designed to provide protection from adverse health effects of air contamination on human health, vegetation, and property. Table A-1 summarizes the ambient air quality standards for Madinat Yanbu Al-Sinaiyah. The ambient standards are applicable at all locations in Madinat Yanbu Al-Sinaiyah except within facilities and on surrounding property where public access is limited or otherwise controlled. These standards are based on MEPA Kingdom-wide standards and several site-specific studies of air quality at Madinat Yanbu Al-Sinaiyah prepared for the Royal Commission.

Table A-1

MADINAT YANBU AL-SINAIYAH AMBIENT AIR QUALITY STANDARDS

Pollutant	Duration of Averaging Period	Maximum Concentration*	Number of Exceedances Allowed	Measurement Methods** (References)
Sulfur dioxide (SO_2)	1-hour	730 ug/m^3 (0.28 ppm)	Two in a 30-day period	Pararosaniline method or equivalent fluorescent method
	24-hour	365 ug/m^3 (0.14 ppm)	One in a 12-month period	"
	Annual	80 ug/m^3 (0.03 ppm)	Not to be exceeded in a 12-month period	"
Inhalable particulates*** IP - 1	24-hour	150 ug/m^3	One in a 12-month period	Size selective high volume sampler
	Annual	50 ug/m^3	Not to be exceeded in a 12-month period	"
IP - 2	24-hour	340 ug/m^3	One in a 12-month period	"
	Annual	80 ug/m^3	Not to be exceeded in a 12-month period	"
Photochemical oxidants defined as ozone (O_3)	1-hour	235 ug/m^3 (0.12 ppm)	Two in a 30-day period	Chemiluminescence method or equivalent ultraviolet method
Nitrogen oxides defined as nitrogen dioxide (NO_2)	1-hour	660 ug/m^3 (0.35 ppm)	Two in a 30-day period	Gas phase chemiluminescence method
	Annual	100 ug/m^3 (0.053 ppm)	Not to be exceeded in a 12-month period	"

IP-1 Inhalables measured as PM10
IP-2 Inhalables measured as PM15

Pollutant	Duration of Averaging Period	Maximum Concentration*	Number of Exceedances Allowed	Measurement Methods** (References)
Carbon monoxide (CO)	1-hour	40 mg/m^3 (35 ppm)	One in a 12-month period	Nondispersive infrared spectroscopy
	8-hour	10 mg/m^3 (9 ppm)	One in a 12-month period	"
Lead	3 months	1.5 ug/m^3	-	Atomic absorption spectroscopy
Hydrogen sulfide (H_2S)	1-hour	200 ug/m^3 (0.14 ppm)	Two in a 30-day period	Gas bubbler-methylene blue method
	24-hour	40 ug/m^3 (0.03 ppm)	One in a 12-month period	"
Fluoride (F^-)	Monthly	1.0 ug/m^3 (0.001 ppm)	Not to be exceeded in a 30-day period	Gas bubbler-specific ion electrode
Chlorine (Cl_2)	1-hour	300 ug/m^3 (0.10 ppm)	Not to be exceeded in a 30-day period	-
Amonia NH3	1-hour	1,800 ug/m^3 (2.6 ppm)	Not to be exceeded in a 30-day period	-
Hydrocarbons (Non-methane)	3-hour(x)	160 ug/m^3	Not to be exceeded in a 30-day period	Photo Ionization, Flame Ionization

Table A-1 (Cont'd.)

Notes:

* Concentration expressed in units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 25°C and a reference pressure of 760 mm of mercury. Key to units of measurement:

- ug/m^3 = micrograms per cubic meter
- mg/m^3 = milligrams per cubic meter
- ppm = parts per million (by volume)

** The Royal Commission is responsible for approving equivalent measurement methods.

*** Inhalable particulates (IP) shall be considered for the purposes of these standards as any matter dispersed in the atmosphere in the form of individual solid and liquid particles larger than single molecules (about 0.0002 um in diameter), but smaller than 10 or 15 um. The exceedance of IP standards as a result of abnormal natural background concentration shall not be considered as a violation.

x Sampling period 0600 hours - 0900 hours

3.1.3 Air Pollution Source Standards

Air pollution source standards are designed to prevent, control, or abate air pollution, and to attain and maintain ambient air quality within standards. The air pollution source standards are applicable to new or modified facilities or industrial processes in Madinat Yanbu Al-Sinaiyah. Table A-2 summarizes air pollution emission limits or source standards for point source discharges to the atmosphere. These standards are broadly the same as those promulgated by MEPA for the Kingdom in 1401-01, 1402 H.

TABLE A-2

AIR POLLUTION SOURCE STANDARDS[1]

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
Combustion facilities	A) Fossil - fuel fired steam generating unit[2] or furnaces with a heat input capacity more than 250 MBTU/hr (73 MW)	Particulates	43 ng/J (0.1 lb/MBTU)	Cyclone, ESP
		SO_2	340 ng/J (0.8 lb/MBTU)	Scrubber
		NOx	86 ng/J (0.2 lb/MBTU) gas fired	Combustion controls
			130 ng/J (0.3 lb/MBTU) oil fired	
		Opacity	20 percent except for one six minute period per hour of not more than 27 percent	-
	B) Electric utility[3] steam generating units operated on fossil-fuel	Particulates	13 ng/J (0.03 lb/MBTU)	Cyclone, ESP
		SO_2	425 ng/J (1.0 lb/MBTU)	Scrubber
		NOx	Same as (A)	
		Opacity	Same as (A)	
	C) Industrial - commercial - institutional steam generating units or furnaces with a heat capacity more than 100 MBTU/hr (29 MW)	Particulates	43 ng/J (0.1 lb/MBTU)	Cyclone, ESP
		SO_2	215 ng/J (0.5 lb/MBTU)	Scrubber
		NOx	Same as (A)	
		Opacity	Same as (A)	
Incinerators (Municipal waste)	Exit Gases	Particulates	180 mg/dscm corrected to 12% CO_2	Cyclones, scrubbers, ESP

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
Petroleum refineries	FCC unit catalyst regenerator	Particulates (non-sulfate)	1.0 kg/MT of coke burn-off	Cyclones, ESP
		Opacity	30 percent	-
		CO	500 ppm	CO boiler or high temp. regeneration
		SO_2	50 ppm with an add-on control device	Scrubber
			9.8 kg/MT of coke burn-off without an add-on control device	
	Fuel gas combustion	H_2S content of fuel gas	230 mg/dscm	Amine scrubbing
	Claus sulfur recovery plants	SO_2	250 ppm at zero percent oxygen on dry basis if emissions are controlled by an oxidation or reduction system followed by an incinerator	Two or three stage clause process
			300 ppm of sulfur compounds and 10 ppm H_2S calculated as SO_2 if not followed by an incinerator	
	Oil water separator tank,(4) slop oil tank, storage vessel	VOC	Shall be equiped with a fixed roof tank	-

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
	Valves, pumps and compressor	VOC	10,000 ppm maximum at surface	Good maintenance
	Pressure relief valves	VOC	500 ppm maximum at surface	Good maintenance
Portland cement plants	Kiln gases	Particulates	150 g/MT of feed to the kiln	ESP, fabric filters
		Opacity	20 percent	
	Clinker cooler	Particulates	50 g/MT of feed to the kiln	ESP, fabric filters
	All other sources	Opacity	10 percent	-
Nitric acid plants	Exit gases	NOx	1.5 kg/MT of acid produced (expressed as 100 percent nitric acid)	-
		Opacity	10 percent	
Sulfuric acid plants	Exit gases	SO_2	2 kg/MT of acid produced (expressed as 100 percent sulfuric acid)	Scrubbers
		Acid mist	75 g/MT of acid produced (expressed as 100 percent sulfuric acid)	Scrubbers
		Opacity	10 percent	-

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
Asphalt batch mix plants	All emission points	Particulates	90 mg/dscm	Fabric filters, scrubbers
		Opacity	20 percent (except for units with wet scrubbing control systems)	
Petroleum liquids storage facility(5)	Storage vessels for crude oil with a capacity greater than 420,000 gallons prior to custody transfer and construction commenced after 1978 or Storage vessels for petroleum liquids (inclusive of crude oil) with a capacity more than 40,000 gallons and construction commenced after 1978 and before 1984	VOC	A) If the true vapor pressure is more than 78 mm Hg (1.5 psia) but less than 570 mm HG (11.1 psia), the storage vessel shall equip with one of the following: i) An external floating roof consisting of two seals one above the other	- -

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
			ii) A fixed roof with an internal floating type cover	-
			iii) A vapor recovery system which collects all VOC vapors and gases discharged from the storage vessel to reduce the vapor emission to the atmosphere by at least 95% by weight	-
			iv) Equivalent to i), ii) or iii)	-
			B) If the vapor pressure is more than 570 mm Hg the storage vessel shall be equipped with a vapor recovery system or its equivalent to reduce the emissions to at least 95% by weight	-

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
	Storage vessels constructed after 1984	VOC	A) Storage vessels having a capacity of 40,000 gallons with vapor pressure more than 39 mm Hg (0.75 psia) but less than 570 mm Hg	-
			or	
			Tanks with a capacity between 20,000 gallons and 40,000 gallons with a true vapor pressure more than 207 mm Hg (4 psia) but less than 570 mm Hg, shall meet the following:	-
			i) A fixed roof with an internal floating roof	-
			ii) Floating roof with double seal one above the other	-
			B) Storage vessel having a capacity of 20,000 gallons with a true vapor pressure of above 570 mm Hg shall be equiped with vapor recovery system to reduce the VOC emission to the atmosphere by 95% by wt.	-

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
Secondary brass and bronze production	Exit gases from reverberatory furnace	Particulates	50 mg/dscm	ESP, fabric filters
		Opacity	20 percent	-
Oxygen furnaces for making molten steel from scrap	Exit gases from furnace with a control device	Particulates	23 mg/dscm	ESP, fabric filters
		Opacity	10 percent	-
Sewage treatment plants	Sewage sludge incinerator	Particulates	0.65 g/kg of dry sludge	Scrubbers, fabric filters
		Opacity	20 percent	-
Primary copper smelters	Dryer gases	Particulates	50 mg/dscm	ESP, fabric filters
	Roaster, smelting furnace or copper converter	SO_2	650 ppm	Scrubbers
		Opacity	20 percent	
Primary zinc smelters	Sintering machine gases	Particulates	50 mg/dscm	ESP, cyclones, fabric filters
	Roster gases	SO_2	650 ppm	Scrubber
	All units	Opacity	20 percent	
Aluminum reduction plants	Pot lines	Total fluorides	1.3 kg/MT of aluminum produced	Scrubbers, ESP
		Opacity	10 percent	
	Anode bake plants	Total fluorides	0.05 kg/MT of aluminum produced	Scrubbers, ESP
		Opacity	20 percent	

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
	Bauxite grinding[6]	Total particulates[7]	0.06 kg/MT	Bag filters, ESP
	Calcining of aluminum hydroxide[6]	Total particulates[7]	2.00 kg/MT	Bag filters, ESP
Grain elevators	Elevator exit gases	Particulates	0.023 g/dscm	Cyclones, fabric filters
		Opacity	Zero percent	
Surface coating of metal furniture	Metal furniture Surface coating operation	VOC	0.9 kg of VOC Per liter of coating solids applied	Hooding
Lime manufacturing plants	Rotary lime-kiln gases	Particulates	0.3 kg/MT of stone feed	ESP, cyclones, scrubbers
		Opacity	15 percent	
Phosphate fertilizer industry:				
1) Wet process phosphoric acid plants (constructed after 1974)	Exit gases from any source	Total fluorides	10 g/MT of equivalent P_2O_5	Scrubbers, ESP
2) Super phosphoric acid plants (constructed after 1974)	Exit gases	Total fluorides	5 g/MT of equivalent P_2O_5	Scrubbers, ESP
3) Diammonium phosphate plants (construced after 1974)	Exit gases	Total fluorides	30 g/MT of equivalent P_2O_5	Scrubbers, ESP

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
4) Triple super phosphate plants (constructed after 1974)	Exit gases	Total fluorides	100 g/MT of equivalent P_2O_5	Scrubbers, ESP
5) Granular superphosphate storage facilities	Exit gases	Total fluorides	0.25 g/hr/MT of equivalent P_2O_5 stored	Scrubbers, ESP
Ferroalloy production facilities	Silicon metal, ferrosilicone, calcium silicone or silicomanganese zirconium producing units	Particulates	0.45 kg/MW-hr	Cyclones, ESP, bag filters, furnace hooding
	High carbon ferrochrome, charge chrome, std. ferro-manganese, calcium carbide or silvery iron producing units	Particulates	0.23 kg/MW-hr	Cyclones, ESP, bag filters, furnace hooding
	Any facility	Opacity	15 percent	
		Carbon monoxide	20 percent by volume	
Steel plants - electric arc furnace (EAF) constructed after 1983	Electric arc furnace Exit gases	Particulates	12 mg/dscm	Furnace hooding, ESP, bag filters, venturi scrubber
	Exit gases from control device	Opacity	3 percent	
	Exit gases from shop or EAF	Opacity	6 percent	
	Exit gases from dust handling system	Opacity	10 percent	

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
Glass manufacturing plants	Glass melting furnace	Particulates	0.5 g/kg glass produced	ESP, bag filters
		Arsenic	0.4 MT/year	Scrubbers
	Pressed and blown glass with a borosilicate recipe melting furnace	Particulates	1.0 g/kg of glass produced	ESP, bag filters
	Textile and wool fiber-glass melting furnace	Particulates	0.5 g/kg glass produced	ESP, bag filters
Lead acid battery manufacturing plants	Grid casting facility	Lead emissions	0.4 mg/dscm	Hooding, ESP, bag filters
	Paste mixing facility	Lead emissions	1.0 mg/dscm	
	Other general operations	Lead emissions	1.0 mg/dscm	
	Lead oxide manufacturing	Lead emissions	5 mg/kg of lead feed	
	Lead reclamation facility	Lead emissions	4.5 mg/dscm	
	Any facility except lead reclamation	Opacity	Zero percent	
	Lead reclamation	Opacity	5 percent	
Metallic mineral processing plants	Exit gases	Particulates	0.05 g/dscm	Cyclones, bag filters, ESP
	Emissions from any source except wet scrubbing control device	Opacity	7 percent	
Ammonium sulfate manufacturing	Ammonium sulfate dryer	Particulates	0.15 kg/MT of ammonium sulfate produced	Scrubbers
		Opacity	15 percent	

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
Phosphate rock plants	Phosphate rock dryer	Particulates	0.03 kg/MT of rock feed	Cyclones, bag filters
		Opacity	10 percent	
	Phosphate rock calciner	Particulates	0.12 kg/MT of rock feed	Cyclones, bag filters
		Opacity	10 percent	
	Phosphate rock grinder	Particulates	0.006 kg/MT	Cyclones, bag filters
		Opacity	Zero percent	
Graphic arts industry - publication rotogravure printing	Fugitive emissions	VOC	16 percent of total mass of VOC solvent and water contained in water borne inks, used at a facility during one calendar month	
Metal coil surface coating paints	Fugitive emissions	VOC	0.28 kg/lit of coating solids with no control	
			0.14 kg/lit of coating solids with control	
Bulk gasoline terminals	Loading operations	Total organic compounds	80 mg/lit of gasoline loaded	
Non-metallic mineral processing plants	Belt conveyors or any other affected facility	Particulates	0.05 g/dscm	Cyclones, bag filters
		Opacity	10 percent except for wet scrubbing system	
Wool-fiberglass insulation manufacturing plants	Exit gases	Particulates	5.5 kg/MT of glass wool pulled	Bag filters

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
Stationary gas turbines[8,9,10,11]	Flue gases	NOx	NOx = 0.0150 $\frac{(14.4)}{Y}$ + F Percent by volume calculated at 15% oxygen and on a dry basis Y = manufacturer rated heat rate at manufacturer's rated peak load (kj/w-hr), or actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not exceed 14.4 kj/w-hr. F[12] = NOx emission allowance for fuel-bound nitrogen as defined below	Combustion control
		SO_2	0.015 percent by volume at 15 percent oxygen on a dry basis	Scrubbers
		Max. sulfur content of fuel	0.8% by weight	
All categories	Flaring activity	Visible emissions	20% maximum opacity except for 3 minutes during any continuous 60-minute period	

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
Plastics manufacturers	Ethylene dichloride unit	Vinyl chloride	10 ppm	Vapor recovery systems
	Oxychlorination reactor	Vinyl chloride	0.2 g/kg of the 100 percent ethylene dichloride product from the oxychlorination process	Vapor recovery systems
	Vinyl chloride formation and purification unit, polyvinyl chloride reactor, stripper, mixing, weighing and monomer recovery systems	Vinyl chloride	10 ppm (average for 3 hr period)	Vapor recovery systems
	Reactor opening losses	Vinyl chloride	0.02 g/kg of polyvinyl chloride produced	Vapor recovery systems
Asbestos mills	Asbestos material	Asbestos	No visible emissions to outside air	ESP, bag filters
Titanium dioxide plant	Chlorinator, chlorine storage, chlorine scrubber	Chlorine[13]	30 mg/m^3	Scrubbers
	Material storage, material handling and bagging	Particulates	0.05 g/dscm	Bag filters, cyclones
		Opacity	7 percent except for wet scrubbing system	
Hydrochloric acid plant	By-product exhaust	Hydrogen chloride[14]	0.25 kg/MT of acid produced	Scrubbers
Chlorine manufacturing	Exit gases	Chlorine gas[13]	30 mg/m^3	Alkaline scrubbers, water absorbers
Brick and related clay products manufacturing[15]	Raw material handling (dryers, grinders etc)	Particulates	0.5 kg/MT of product	Hooding, fabric filters, cyclones, ESP

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
Synthetic fiber Production facilities	All facilities that produce acrylic and non-acrylic fibers	VOC	10 Kg VOC/MT of solvent	
	facilities that produce only non-acrylic fibers	VOC	17 Kg of VOC/MT of solvent	
Synthetic organic chemical manufacturing industry: 1) Air Oxidation Unit Processes	Any facility producing any of the chemicals listed in Attachment - 1 as product or by-product	VOC	Reduce emissions of TOC (Total organic carbon minus methane and ethane) by 98% by wt or to a concentration of 20 ppmv on a dry basis corrected to 3% oxygen. Combust the emissions in a flare or incinerator.	Flaring or incineration
2) Distillation operations	Any facility producing any of the chemicals listed in Attachment - 2 as product or by-product	VOC	Reduce emissions of TOC (minus methane and ethane) by 98% by wt or concentration of 20 ppmv on a dry basis corrected to 3% oxygen. Combust the emissions in a flare or incinerator.	Flaring or incinerator
Polymeric coating supporting subtracts facilities	Coating operation and coating mix operation	VOC	Install, operate and maintain a total enclosure around the coating operation and vent the captured VOC emissions from the total enclosure to a control device that is atleast 95% efficient.	

INDUSTRY	SOURCE	POLLUTANT	STANDARD	APPLICABLE CONTROL TECHNOLOGY
Industrial Surface coating - large appliances	Coating operation	VOC	0.9 Kg of VOC per liter of applied coating solids.	
Beverage-can surface coating industry	Coating operation	VOC	0.29 Kg of VOC per liter of coating solids from each two-piece can exterior base coating operation. 0.46 kg of VOC per liter of coating solids from each two-piece can clear base coating operation and from each over varnish coating operation. 0.89 of VOC per litre of coating solids from each two-piece can inside spray coating operation.	

NOTES:

- The owner shall install suitable continuous automatic emission monitoring equipment on the applicable emission sources as recommended by the Director, Environmental Control, Royal Commission for Yanbu.
- The owner of the facility shall install necessary sampling ports on all emission stacks. The details of the sampling ports can be obtained from the Director, Environmental Control.
- The applicable sampling methods shall be obtained from the Director, Environmental Control.
- dscm means dry standard cubic meter.

1. All the standards were established from United States Environmental Protection Agency (USEPA): Code of Federal Regulations (CFR) Title-40, Part 60 and 61, July 1990
   and
   Meteorology and Environmetnal Protection Administration (MEPA), Document No. 1409-01 titled 'Environmental Protection Standards', unless otherwise the reference was stated separately.
2. Fossil-fuel fired steam generating unit means a furnace or boiler used in the process of burning fossil fuel for the purpose of producing steam by heat transfer.
3. Electric utility steam generating unit means any steam electric generating unit that is constructed for the purpose of supplying more than one third of its potential electric output capacity and more than 25MW electrical output to any utility power distribution system for sale. Any steam supplied to a steam distribution system for the purpose of providing steam to a steam-electric generator that would produce electrical energy for sale is also considered in determining the electrical energy output capacity of the affected facility.
4. Cover not required to oil-water separation tanks etc. in cases where its use would constitute a fire or safety hazard.
5. Floating roof tanks shall be considered adequate for storage of crude oil capacity less than 40,000 gallons, provided, a consistent seal inspection and reporting program is implemented by the owner.
6. Based on EPA, compilation of Air Pollution Emission Factors, AP-42, Section 7.1, August 1977.
7. Total particulates include particulate fluorides.
8. Stationary gas turbine means any simple cycle gas turbine, regenerative cycle gas turbine or any gas turbine portion of a combined cycle steam/electric generating system that is not self propelled.

9. Simple cycle gas turbine means any stationary gas turbine which does not recover heat from the gas turbine exhaust gases to preheat the inlet combustion air to the gas turbine, or which does not recover heat from the gas turbine exhaust gases to heat water or generate steam.

10. Regenerative cycle gas turbine means any stationary gas turbine which recover heat from the gas turbine exhaust gases to preheat the inlet combustion air to the gas turbine.

11. Combined cycle gas turbine means any stationary gas turbine which recover heat from the gas turbine exhaust gases to heat water or generate steam.

12. The value of F for the Stationary Gas Turbines' NOx estimation shall be obtained from the table given below:

Fuel bound Nitrogen (Percent by weight)	F (NOx percent by weight)
N<0.015	0
0.015<N<0.1	0.04(N)
0.1<N<0.25	0.004+0.0067(N-0.1)
N>0.25	0.005

13. Establishd from FRG - Environmental Law (German std.) titled Air Purity Regulations, Copyright 1978 by the Bureau of National Affairs, Inc.

14. Based on EPA, compilation of Air Pollution Emission Factors, AP-42, Section 5.7, February 1972.

15. Based on EPA, compilation of Air Pollution Emission Factors, AP-42, Section 8.3, April 1973.

ATTACHMENT 1

Acetaldehyde
Acetic acid
Acetone
Acetonitrile
Acetophenone
Acrolein
Acrylic acid
Acrylonitrile
Anthraquinone
Benzaldehyde
Benzoic acid, tech.
1.3-Butadiene
p-t-Butyl benzoic acid
N-Butyric acid
Crotonic acid
Cumene hydroperoxide
Cyclohexanol
Cyclohexanone
Dimethyl terephthalate
Ethylene dichloride
Ethylene oxide
Formaldehyde
Formic acid
Glyoxal
Hydrogen cyanide
Isobutyric acid
Isophthalic acid
Maleic anhydride
Methyl ethyl ketone
a-Methyl styrene
Phenol
Phthalic anhydride
Propionic acid
Propylene oxide
Styrene
Terephthalic acid

ATTACHMENT 2

Acetaldehyde
Acetaldol
Acetic acid
Acetic anhydride
Acetone
Acetone cyanohydrin
Acetylene
Acrylic acid
Acrylonitrile
Adipic acid
Adiponitrile
Alcohols, C-11 or lower, mixtures
Alcohols, C-12 or higher, mixtures
Allyl chloride
Amylene
Amylenes, mixed
Aniline
Benezene
Benezenesulfonic acid
Benezenesulfonic acid C_{10-16}-alkyl derivatives sodium salts
Benzoic acid, tech.
Benzyl chloride
Biphenyl
Bisphenol A
Brometone
1,3-Butadiene
Butadiene and butene fractions
n-Butane
1,4-Butanediol
Butanes, mixed
1-Butene
2-Butene
Butenes, mixed
n-Butyl acetate
Butyl acrylate
n-Butyl alcohol
sec-Butyl alcohol
tert-Butyl alcohol
Butylbenzyl phthalate
Butylene glycol
tert-Butyl hydroperoxide
2-Butyne-1,4 - diol
Butyraldehyde
Butyric anhydride
Caprolactam
Carbon disulfide
Carbon tetrabromide
Carbon tetrachloride
Chlorobenzene
2-Chloro-4-(ethylamino)-6-(isopropylamino)-s-triazine
Chloroform

p-Chloronitrobenzene
Chloroprene
Citric acid
Crotonaldehyde
Crotonic acid
Cumene
Cumene hydroperoxide
Cyanuric chloride
Cyclohexane
Cyclohexane, oxidized
Cyclohexanol
Cyclohexanone
Cyclohexanone oxime
Cyclohexene
1,3-Cyclopentadiene
Cyclopropane
Diacetone alcohol
Dibutanized aromatic concentrate
1,4-Dichlorobutene
3,4-Dichloro-1-butene
Dichlorodifluoromethane
Dichlorodimethylsilane
Dichlorofluoromethane-Dichlorohydrin
Diethanolamine
Diethylbenzene
Diethylene glycol
Di-n-heptyl-n-nonyl undecyl phthalate
Di-isodecyl phthalate
Diisononyl phthalate
Dimethylamine
Dimethyl tarephthalate
2,4-Dinitrotoluene
2,4- (and 2,6) - dinitrotoluene
Dioctyl phthalate
Dodecene
Dodecylbenzene, non linear
Dodecylbenzenesulfonic acid
Dodecylbenzenesulfonic acid, sodium salt
Epichlorohydrin
Ethanol
Ethanolamine
Ethyl acetate
Ethyl Acrylate
Ethylbenzene
Ethyl chloride
Ethyl cynaide
Ethylene
Ethylene dibromide
Ethylene dichloride
Ethylene glycol
Ethylene glycol monobutyl
Ethylene glycol monoethyl ether
Ethylene glycol monoethyl ether acetate
Ethylene glycol monomethyl ether
Ethylene oxide
2-Ethylhexanal

2-Ethyhexyl alcohol
(2-Ethylhexyl) amine
Ethylmethylbenzene
6-Ethyl-1,2,3,4-tetrahydro 9,10-antracenedione
Formaldehyde
Glycerol
n-Heptane
Heptenes (mixed)
Hexadecyl chloride
Hexamethylene diamine
Hexamethylene diamine adipate
Hexamethylenetetramine
Hexane
2-Hexenedinitrile
3-Hexenedinitrile
Hydrogen cyanide
Isobutane
Isobutanol
Isobutylene
Isobytyraldehyde
Isodecyl alcohol
Isooctyl alcohol
Isopentane
Isophthalic acid
Isoprene
Isopropanol
Ketene
Linear alcohols, ethoxylated, mixed
Linear alcohols, ethoxylated, and sulfated, sodium salt, mixed
Linear alcohols, sulfated, sodium salt, mixed
Linear alkylbenzene
Magnesium acetate
Maleic anhydride
Melamine
Mesityl oxide
Methacrylonitrile
Methanol
Methylamine
ar-Methylbenzenediamine
Methyl chloride
Methylene chloride
Methyl ethyl ketone
Methyl iodide
Methyl isobutyl ketone
Methyl methacrylate
2-Methylpentane
1-Methyl-2-pyrrolidone
Methyl tert-butyl ether
Naphthalene
Nitrobenzene
1-Nonene
Nonyl alcohol
Nonylphenol
Nonylphenol, ethoxylated

Ocetene
Oil-soluble petroleum sulfonate, calcium salt
Oil-soluble petroleum sulfonate, sodium salt
Pentaerythritol
n-Pentane
3-Pentenenitrile
Pentenes, mixed
Perchloroethylene
Phenol
1-Phenylethyl hydroperoxide
Phenylpropane
Phosgene
Phthalic anhydride
Propane
Propionaldehyde
Propionic acid
Propylalcohol
Propylene
Propylene chlorohydrin
Propylene glycol
Propylene oxide
Sodium cyanide
Sorbitol
Styrene
Terephthalic acid
1,1,2,2-Tetrachloroethane
Tetraethyl lead
Tetrahydrofuran
Tetra (methyl-ethyl) lead
Tetramethyl lead
Toluene
Toluene-2, 4-diamine
Toluene-2,4-(and, 2.6)-diisocyanate (80/20 mixture)
Tribromomethane
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
Trichlorofluoromethane
1,1,2-Trichloro-1,2,2-trifluoroethane
Triethanolamine
Triethylene glycol
Vinyl acetate
Vinyl chloride
Vinylidene chloride
m-Xylene
o-Xyiene
p-Xylene
Xylenes (mixed)
m-Xylenol

APPENDIX – B

ENVIRONMENTAL PROTECTION STANDARDS

(GENERAL STANDARD)

DOCUMENT NO. 1409.01

ENVIRONMENTAL PROTECTION STANDARDS IN THE KINGDOM OF SAUDI ARABIA

(GENERAL STANDARDS)

DOCUMENT NO. 1409 - 01

Meteorology and Environmental Protection Administration

Jeddah

Kingdom of Saudi Arabia

Translated from the official Arabic version

KINGDOM OF SAUDI ARABIA

MINISTRY OF DEFENCE & AVIATION

METEOROLOGICAL & ENVIRONMENTAL PROTECTION ADMINISTRATION

Pursuant to the Royal Decree No. 7/M/8903 dated 21/4/1401 which assigned the Meteorology and Environmental Protection Administration for the control of pollution and protection of environment in accordance with the arrangement set forth in the decision of the Supreme Commission for administrative reform No. 86 dated 20/8/1399; MEPA has established the following standards.

1 — Title

These standards shall be referred to as the Environmental Protection Standards.

2 — Purpose

The purpose of these standards is to provide appropriate bases for the evaluation and regulation of industrial and urban activities that currently exist in the Kingdom and to help in the planning, design, execution and operation of facilities that will be established in a manner which shall not adversely affect the health, safety and welfare of the people and which shall help in promoting their overall economic and social well-being and in protecting the Kingdom's environment in general.

3 — Effective Date

These standards shall come into force as of the first of D. Qa'dah 1402.

4 — Definitions

Unless the context otherwise requires, terms and expressions stated hereinafter shall have the meanings as defined below.

1 — The Administration
means the Meteorological and Environmental Protection Administration established under the Royal Decree No. 7/M/8903 dated 21/4/1401.

2 — The General Standards of Environmental Protection
means the standards which express the general policy for pollution control in the Kingdom and apply to the design and operation of facilities.

3 — Environmental Quality Standards
means the limits of air, water and land pollution that should not be exceeded.

4 — Source Standards
means pollution control technologies and operational practices which reduce pollution from a facility and include as well the standards for discharge of pollutants from their sources.

5 — Guidelines
they are not standards and are adopted for cases where baseline information is not sufficient for the issuance of specific standards at the respective time.

6 — Facility
means any plant or activity which is expected to be a source of pollution or environmental deterioration.

7 — Major Facility
means a facility with sufficient capacity to cause a substantial impact on the quality of ambient air or water.

8 — Public Facility
means any facility owned or operated by any ministry, department, governmental or semi-governmental unit regardless of its size or function.

9 — Private Facility
means any facility owned or operated by any natural or artificial organization whether corporate or not.

10 — Modification (i.e. of Facilities)
means a change in the design or operation of a facility which has the potential to result in increased pollution from the facility. For the purpose of this definition, any replacement of equivalent kind and capacity is not considered a modification.

11 — Major Modification
means a change in the design or operation of an existing facility with a reasonable likelihood of causing a substantial impact on the quality of air or water. For the purpose of this definition any replacement of equivalent kind and capacity is not considered a modification.

12 — Substantial Impact
means any impact with a reasonable likelihood of causing exceedance of the applicable standards alone or in combination with the impact of other sources.

13 — Moderate Impact
an impact which is likely to cause exceedance of the applicable standards only in combination with the impact of other sources.

14 — Minor Impact
any impact which is not likely to cause exceedance of the applicable standards whether alone or in combination with the impact of other sources.

15 — Toxic Substance
means any substance which causes death, disability or discomfort for man or animal whenever available in sufficient quantities, either by touch, inhaling or entering through the mouth, taking into consideration the possibility of the concentration of this material in the food chain, or such substance that may cause damage or destruction for plants or animal on touch or when entering into its food.

16 — Inhalable Particulates
for the purpose of these standards the inhalable particulates shall be considered as any substance dispersed in the atmosphere in the form of individual solid and liquid particles each of which is less than 15 micron in diameter.

17 — Photochemical Oxidants
are substances produced in the atmosphere where certain active chemical compounds, principally the hydrocarbons and nitrogen oxides, are exposed to sun light. For the purpose of these standards the photochemical oxidants shall include ozone, peroxyacyl, nitrates, organic peroxides and other oxidants which contribute to the increase of the oxidants quantity as measured by the method specified in paragraph C of Article 11.

18 — Receiving Water
means a surface water body into which pollutants are or may be directly discharged.

19 — Waste Water
means any contaminated water resulting from the industrial or agricultural processes, or other activities which are of equivalent environmental effect including sanitary sewage.

20 — Mixing Zone
it is a defined area of water directly adjacent to the area of discharge of contaminants where receiving water quality standards may be exceeded and such area is determined pursuant to paragraph E of Article 13.

21 — Pretreatment
means the stage of application of controls to waste water in the industrial areas prior to its discharge to a central treatment facility.

22 — Discharge
means addition of contaminants to the ambient air, receiving water or to a central treatment facility.

23 — Direct Discharge
means a discharge to receiving waters and not to a central treatment facility.

24 — The Best available Technology
means the best available level for controlling pollution in comparison to practices in similar facilities in the Kingdom and other countries.

5 — Applicability

These standards shall apply to all facilities in the Kingdom, existing and newly designed, public and private, except for facilities specifically exempted by MEPA.

6 — Scope and Interpretation

1 — These standards consist of the rules appearing herein, including any detailed description of the environmental protection standards and methods of application as issued by MEPA from time to time.

2 — MEPA shall be the only authority to interpret and determine the meaning and scope of these standards.

3 — MEPA may from time to time amend or supplement these standards as the need arises.

7 — General Environmental Standards Applicable to New Facilities

1 — All major new facilities, or major modifications to existing facilities, shall be designed, operated and maintained so as to avoid exceedances of the ambient environmental standards as promulgated for the Kingdom at the time of approval of the design.

2 — Each major new facility or major modification to an existing facility shall incorporate the best available technology for control of pollutant discharges, and for the disposal of wastes associated with the operation of the facility.

3 — All new facilities and modifications to existing facilities shall be designed and operated so as to avoid the discharge of any toxic substance, whether specifically regulated or not, in quantities sufficient to be harmful to the public health.

8 — General Environmental Standards Applicable to Existing Facilities

1 — All major existing facilities shall be operated and maintained so as to avoid exceedances of the ambient environmental standards promulgated for the Kingdom. Additional control technology shall be installed at major existing facilities where necessary so as to avoid exceedance of the ambient environmental standards.

2 — Each existing facility shall be operated and maintained so as to avoid the discharge of any toxic substance, whether specifically regulated or not, in quantities sufficient to be harmful to the public health.

9 — Exceptions

The Department shall have the power to grant some facilities, under special circumstances, an exception from the application of some sources or performance standards. MEPA shall evaluate the application submitted by the owner of any facility for obtaining an exception from the application of any special standard. MEPA shall make its decision with respect to each case separately after the owner submits all the required information related to said matter and after making sure that such exception shall not result in exceeding the environmental quality standards and is not detrimental to the public health.

10 — Ambient Air Quality Standards

A — Sulfur Dioxide (SO_2)

A-1 Purpose: The purpose of these standards is to prevent adverse health effects and adverse effects upon vegetation.

A-2 Standards:

(a) During any 30 day period, the one-hour average SO_2 concentration shall not exceed 730 $\mu g/m^3$ (0.28 ppm) more than twice at any location.
(b) During any 12-month period, the 24-hour average SO_2 concentration shall not exceed 365 $\mu g/m^3$ (0.14 ppm) more than once at any location.
(c) During any 12-month period, the annual average SO_2 concentration shall not exceed 80 $\mu g/m^3$ (ppm) at any location.

A-3 Measurement Method: The Pararosaniline Method (WHO 1976) shall be the reference method of measurement of SO_2 concentrations. MEPA shall be responsible for approving equivalent measurement methods.

10 — B Inhalable Particulates (IP)

B-1 Purpose: The purpose of these standards is to protect susceptible populations from adverse health effects, taking into account the synergistic effects associated with the presence of other contaminants.

B-2 Standards:

(a) During any 12-month period, the 24-hour maximum inhalable particulate concentration shall not exceed 340 $\mu g/m^3$ more than once at any location.
(b) During any 12-month period, the annual average inhalable particulate concentration shall not exceed 80 $\mu g/m^3$ at any location.
(Note: The exceedance of the 24-hour or annual inhalable particulate standard as a result of abnormal natural background concentrations shall not be considered as a violation of the standard.)

B-3 Measurement Method: The concentration of inhalable particulates shall be determined by the use of a size selective high volume sampler. Specifications for equipment and filter media shall conform to standards acceptable to MEPA.

10 — C Photochemical Oxidants Defined as Ozone (O_3)

C-1 Purpose: The purpose of this standard is to prevent significant human discomfort or damage to vegetation and materials.

C-2 Standard: During any 30-day period, the one-hour average concentration of photochemical oxidants shall not exceed 295 $\mu g/m^3$ (0.15 ppm) more than twice at any location.

C-3 Measurement Method: The chemiluminescence method (WHO 1976) shall be the reference method for measurement of photochemical oxidants as ozone. MEPA will be responsible for approving equivalent measurement methods.

10 — D Nitrogen Oxides Defined as Nitrogen Dioxide (NO_2)

D-1 Purpose: The purpose of these standards is to prevent the development of nitrogen dioxide concentrations which could produce adverse health effects or lead to the production of significant concentrations of photochemical oxidants.

D-2 Standards:

(a) During any 30 day period, the one-hour average NO_2 concentration shall not exceed 660 $\mu g/m^3$ (0.35 ppm) more than twice at any location.
(b) During any 12-month period, the annual average NO_2 concentration shall not exceed 100 $\mu g/m^3$ at any location.

D-3 Measurement Method: An NO_2 analyzer based on the gas phase chemiluminescence measurement principle of NO with O_3 is designated as the reference method. Specifications for measurement equipment shall conform to standards acceptable to MEPA.

10 — E Carbon Monoxide (CO)

E-1 Purpose: The purpose of these standards is to prevent short-term adverse health effects in sensitive population groups and in normal exercising population groups.

E-2 Standards:

(a) During any 30-day period, the one-hour average CO concentration shall not exceed 40 mg/m^3 (35 ppm) more than twice at any location.
(b) During any 30-day period, the 8-hour average CO concentration shall not exceed 10 mg/m^3 (9 ppm) more than twice at any location.

E-3 Measurement Method: The nondispersive infrared (MDIR) technique (WHO 1972) will be the reference method for CO. MEPA will be responsible for approving equivalent measurement methods.

10 — F Hydrogen Sulfide (H_2S)

F-1 Purpose: The purpose of these standards is to protect human and animal health, and to avoid the nuisance caused by exposure to H_2S. (These standards will not completely prevent materials damage; therefore, special materials preservation step should be taken in regions where elevated H_2S levels are expected.)

F-2 Standards:

(a) During any 12 month period, the one-hour average H_2S concentration shall not exceed 200 $\mu g/m^3$ (0.14 ppm) more than once at any location.
(b) During any 12-month period, the 24-hour average H_2S concentration shall not exceed 40 $\mu g/m^3$ (0.03 ppm) more than once at any location.

F-3 Measurement Method: The Gas Bubbler-Methylene Blue method (APHA 1972) shall be the reference method for H_2S. MEPA will be responsible for approving equivalent measurement methods.

10 — G Fluorides (F^-)

G-1 Purpose: The purpose of this standard is to protect against adverse effects on vegetation and grazing animals.

G-2 Standards: During any 30-day period, the monthly average fluoride concentration shall not exceed 1.0 $\mu g/m^3$ (0.001 ppm) at any location.

G-3 Measurement Method: The specific ion electrode (Thompson et al. 1971) method shall be the reference method for fluoride measurement. MEPA will be responsible for approving equivalent measurement methods.

11. Air Pollution Source Standards

11 — A Combustion Facilities: All fossil fuel fired boilers and furnaces having a heat input capacity equal to or greater than 30 megawatts (100 MBTU/hr.) shall utilize appropriate gas cleaning equipment to limit emissions to the following rates:

(1) 43 ng/j (0.1 lb/MBTU) of total particulates
(2) 1 μg/j (2.3 lb/MBTU) of SO_2
(3) 130 ng/j (0.3 lb/MBTU) of NO_x for oil fired facilities
(4) 86 ng/j (0.2 lb/MBTU) of NOx for gas fired facilities

11 — B Petroleum and Petrochemical Facilities

B-1 Storage Vessels for Petroleum Liquids Storage vessels for volatile organic compounds (VOC) which have a capacity greater than 1000 barrels (5614 cubic feet) shall be equipped for vapor emission control as follows:

(a) Vapor recovery or equivalent systems are required for VOC having a vapor pressure in excess of 570 mm Hg. Floating roof tanks shall be considered adequate for storage of crude oil providing a consistent seal inspection and reporting program is implemented by owner.
(b) Floating roof with double boot seal or equivalent systems are required for VOC having a vapor pressure in excess of 78 mm Hg (1.5 psi) but less than 570 mm Hg (11 psi)

B-2 FCC Unit Catalyst Regenerators

FCC unit catalyst regenerators shall utilize:
(a) CO boilers or high temperature regeneration to limit CO emissions to 500 ppm and
(b) appropriate air cleaners to limit particulate emissions to 1.0 kg per metric ton of coke burn-off.

B-3 Fuel Gas Combustion Process

Fuel gas combustion process shall utilize amine scrubbing or other appropriate gas cleaning process to limit H_2S content of fuel gases to 230 mg per dry standard cubic meters (150 ppm).

B-4 Claus Sulfur Recovery Plants

Sulfur recovery plants shall utilize a two-or three-stage Claus process to achieve at least 95% recovery of total sulfur.

B-5 Fugitive Emission

Fugitive emission of VOC from Petroleum and Petrochemical process shall be limited through the utilization of good maintenance and inspection procedures as well as monitoring of potential VOC emission points.

11 — C Fertilizer Plants

Fertilizer plant purge gases shall be controlled by incineration or other acceptable cleaning method to ensure 99 percent removal of volatile organic compounds.

11 — D Cement Plants

D-1 Cement Kilns

Emissions from cement kilns shall be controlled by electrostatic precipitators, fabric filters or other suitable means to limit the emission of particulates to no more than 0.15 kg/metric ton.

D-2 Clinker Coolers

Emissions from clinker coolers shall be controlled by fabric filters or other suitable means to limit the emission of particulates to no more than 0.05 kg/metric ton.

11 — E Primary Aluminum Reduction Plants

E-1 Pot Lines

Emission from aluminum reduction pot lines shall be controlled by suitable air cleaning equipment to limit the emission of total fluorides to no more than 1.25 kg/metric ton.

E-2 Anode Bake Plants (plus Pole Heating Plants)

Emissions from anode bake plants (plus pole heating plants) shall be controlled by suitable air cleaning equipment to limit the emission of total fluorides to no more than 0.05 kg/metric ton.

11 — F Iron and Steel Plants: Electric Arc Furnaces

Emissions from electric arc furnaces shall be controlled by suitable gas cleaning equipment to limit the emission of particulates to 12 mg/dscm.

11 — G Lime Manufacturing Plants: Rotary Kilns

Emissions from rotary kilns shall be controlled by suitable gas cleaning equipment to limit the emission of particulates to no more than 0.2 kg/metric ton of limestone feed material.

11 — H Visible Emissions from Industrial Activities

Visible emissions from all industrial activities (except for water vapor) shall be controlled to 20% maximum capacity except for three-minutes during any continuous sixty-minute period.

12. Receiving Water Guidelines

12 — A Purpose: These guidelines for receiving water quality are intended to provide guidance for the location, design and operation of new facilities and modifications to existing facilities, and for the operation of existing facilities, pending development of receiving water standards.

12 — B Guidelines: The following guidelines for receiving water quality apply at the edge of the mixing zone and beyond for the discharge from any facility to the coastal waters. Unless otherwise stated, each interim guideline refers to a thirty-day average.

B — 1 Physio-chemical Pollutants

	(Pollutants)	(Guidelines at edge of mixing zone)
(a)	Floatables	Non attributable to the discharge
(b)	PH	0.1 PH units (maximum change from typical local baseline conditions)
(c)	Total suspended solids (TSS)	5% (all references to percentage are maximum changes from typical local baseline conditions) (in this and following paragraphs)
(d)	Temperature	1°C (maximum change from typical local baseline conditions)
(e)	Oil and grease	Management measures required*
(f)	Dissolved Oxygen (DO)	5%
(g)	Turbidity	5%

* Facilities using, transferring or storing oil and petroleum hydrocarbons are required to prepare, maintain and update a spill prevention, control and clean-up plan.

B — 2 Organic Pollutants

	(Pollutants)	(Guidelines at edge of mixing zone)
(a)	Chemical Oxygen demand (COD)	5%
(b)	Total organic carbon (TOC)	5%
(c)	Total kjeldahl nitrogen (TKN)	5%
(d)	Chlorinated Hdro carbons	5%
(e)	Oil and Grease	5%
(f)	Phenolics	5%

B — 3 Non-organic Pollutants

	(Pollutants)	(Guidelines at edge of mixing zone)
(a)	Amonia	5%
(b)	Arsenic	5%
(c)	Cadmium	5%
(d)	Chloride	5%

(e)	Residual Chlorine	5%
(f)	Total Chromium	5%
(g)	Copper	5%
(h)	Total Cyanide	5%
(i)	Lead	5%
(j)	Mercury	5%
(k)	Nickel	5%
(l)	Total Phosphate	5%
(m)	Zink	5%
(n)	Dissolved Oxygen	5%

B — 4 Biological Pollutants

	(Pollutants)	(Guidelines at edge of mixing zone)
(a)	Total Coliform	70 most probable number per 100 ML (average for 30 day period).

13. Performance Standards for Direct Discharge

A — Purpose: Performance standards for direct discharge are intended to require waste water source to adopt best practical controls.

B — Scope: Performance standards for direct discharge apply to sanitary sewage, surface runoff (including fire control waters), cooling water discharges, boiler water conditioning blowdown, process wastewaters, and any other wastewater.

C — General Performance Standards: Wastewaters of different character shall be segregated to the maximum extent possible. Uncontaminated surface runoff and once-through cooling waters may be discharged to receiving waters without treatment.

D — Specific Performance Standards: The following performance standards apply to wastewaters at the end of the outfall and before discharge to coastal waters or to any channel of wastewater.

D — 1 Physio-Chemical Pollutants

	(Pollutants)	(Allowable effluent Level)
(a)	Floatables	None
(b)	PH	6-9 pH units
(c)	Total Suspended solids (TSS)	15 mg/l (max.)

(d)	Temperature	MEPA determines the thermal properties of discharged water to fit the properties of receiving water and such properties are determined on a case by case basis.
(e)	Turbidity	75 NTU (max.)

D — 2 Organic Pollutants

	(Pollutants)	(Allowable Effluent Level)
(a)	Biochemical Oxygen Demand	25 mg/l
(b)	Chemical Oxygen Demand	150 mg/l
(c)	Total Organic Carbon (TOC)	50 mg/l
(d)	Total kjeldahl nitrogen (TKN)	5 mg/l
(e)	Total Chlorinated Hydrocarbons	0.1 mg/l
(f)	Oil and Grease	8 mg/l (not to exceed 15 mg/l in any individual discharge)
(g)	Phenols	0.1 mg/l

D — 3 Non-organic Pollutants

	(Pollutants)	(Allowable Effluent Level 30-day Average)
(a)	Ammonia (as nitrogen)	1.0 mg/l
(b)	Arsenic	0.1 mg/l
(c)	Cadmium	0.02 mg/l
(d)	Chlorine (residual)	0.5 mg/l
(e)	Chromium (total)	0.1 mg/l
(f)	Copper	0.2 mg/l
(g)	Cyanide	0.05 mg/l
(h)	Lead	0.1 mg/l
(i)	Mercury	0.001 mg/l
(j)	Nickel	0.2 mg/l
(k)	Phosphate (Total) (as Phosphorous)	1.0 mg/l
(l)	Zinc	1.0 mg/l

D — 4 Biological Pollutants

	(Pollutant)	(Allowable Effluent Level — 30-day Average)
(a)	Total Coliform	1000 MPN per 100 ml

E — Mixing Zone

Each direct discharge shall be adequately dispersed and mixed with the receiving waters. A mixing zone shall be designed to minimize adverse effects to designated beneficial uses. Adequacy of the mixing zone shall be determined on a case-by-case basis.

14. Pretreatment Guidelines for Discharge to General Treatment Facilities.

A — Purpose: Pretreatment guidelines are intended to provide guidance for the removal of substances that significantly effect the performance of the central treatment facilities, and substances that are not adequately controlled at central treatment facilities.

B — Scope: Pretreatment guidelines and standards apply to all facilities and modifications covered by the environmental standards which discharge to a central industrial or municipal wastewater treatment facility.

C — General Pretreatment Guidelines: Wastewaters of different character shall be segregated to the maximum extent possible. Sanitary wastes may be sent to a central treatment facility without pretreatment. Contaminated wastewaters other than sanitary wastes shall be treated on-site to meet applicable pretreatment requirements.

D — Specific Pretreatment Guidelines: The following pretreatment guidelines apply to wastewater before discharge to a central treatment facility. The pretreatment guidelines provide a range for allowable levels of pollution in the effluent.

D — 1 Physio-chemical Pollutants

	(Pollutants)	(Guidelines)
(a)	Total suspended Solids (TSS)	2,000 mg/1 (max.)
(b)	pH	5-10 pH units
(c)	Temperature	60° C (max.)

D — 2 Organic Pollutants

	(Pollutants)	(Guidelines)
(a)	Chemical Oxygen Demand	1,500 mg/1
(b)	Total organic carbon	1,000 mg/1
(c)	Oil and Grease	120 mg/1
(d)	Phenols	150 mg/1

(e)	Total chlorinated Hydrocarbons	0.5 mg/l

D — 3 Non-organic Pollutants

	(Pollutants)	(Guidelines)
(a)	Arsenic	1.0 mg/l
(b)	Cadmium	0.5 mg/l
(c)	Chromium (Total)	2.0 mg/l
(d)	Copper	1.0 mg/l
(e)	Cyanide (Total)	1.0 mg/l
(f)	Lead	1.0 mg/l
(g)	Mercury	0.01 mg/l
(h)	Nickel	2.0 mg/l
(i)	Zinc	10.0 mg/l

15. Implementation Obligations

1 — It shall be the duty and obligation of the owners, planners and operators of new facilities and modification to existing facilities to ensure that such facilities are located, designed and operated in accordance with these standards.

2 — It shall be the duty and obligation of owners and operators of existing facilities to ensure that such facilities are operated in accordance with these standards.

3 — Subject to other official requirements, owners and operators proposing to build a new facility must contact MEPA and provide specific required data to MEPA including relevant planning and design details indicating the pollution control measures to be taken. MEPA shall review such data and grant written permit within a period not exceeding 3 months after the date of receiving such data from other departments and facilities, prior to execution of such facilities.

4 — Owners and operators of existing facilities are required to supply specific required data to MEPA following notification by MEPA. MEPA may request the carrying out of tests, investigations or analysis to insure compliance with the standards in any existing facility. The owners and operators of existing facilities shall be deemed responsible for submitting data relating to the existing facilities even if they don't receive notification by MEPA requesting such information.

16. Enforcement

1 — It shall be the responsibility of MEPA to ensure that compliance with these standards is enforced.

2 — Every application for a license to construct a new facility or introduce a major modification to an existing facility which is submitted to the competent authority must enclose a certificate stating that MEPA has evaluated the existing facility or the plans for the new facility and ascertained that the subject facility complies with these standards.

3 — In case where MEPA finds that the design of a planned new facility does not incorporate adequate control measures to comply with the standards, MEPA shall so inform the applicable licensing authority and request that a license not be issued to the facility until it rectifies the specific defects cited by MEPA. The facility owners shall also be informed.

4 — In case where MEPA finds that an existing facility is contravening these standards, MEPA shall so inform that facility and request that it be rectified according to a designated schedule. If the contravention continues, MEPA may address a final warning to the facility. If the warning fails to produce positive results, MEPA shall inform the licensing authority concerned and request that the license of the facility be suspended or withdrawn.

5 — MEPA shall carry out spot inspection of any facility to assess compliance with these standards without prior notice or warning.