Chapter 1

Overview of Environmental Issues and Environmental Conservation Practices in Malaysia

This chapter is divided into seven sections which encompass all the basic information required for Japanese companies to work out the most appropriate environmental measures for their particular operations in Malaysia.
Section 1 gives an overview of Malaysia and its relationship with Japan and Japanese companies. Section 2 describes Malaysia's present environmental problems, while Section 3 outlines Malaysia's environmental legislation and administrative framework. Sections 4, 5, and 6 describe the regulatory regime and procedures for dealing with the three main environmental issues in Malaysia - water pollution, air pollution, and industrial waste. Section 7 concerns environmental impact assessment (EIA), which is required prior to plant construction and other projects, and explains the assessment process and the activities to which the EIA system applies. The complete text of the Environmental Quality Act (the most recent 1998 amended edition) is given in Appendix 1, and relevant portions of the regulations pertaining to the treatment of scheduled wastes, notified under the Environmental Quality Act 1974, are provided in Appendix 2.

Section 1
Malaysia and Japanese Companies

1. Strong Bilateral Relations Based on Economic Interests

Malaysia is made up of the eleven states in the Malay Peninsula (West Malaysia) and the two states of Sabah and Sarawak in northern Borneo (East Malaysia) across the South China Sea, together with two federal territories (the capital Kuala Lumpur and the island of Labuan in East Malaysia). The land area of 329,700 square kilometers, which is roughly 90 percent the size of Japan, is home to about 21 million people. The ethnic makeup of the population is approximately 62 percent indigenous Malays, 27 percent ethnic Chinese, and 8 percent Indians. Malaysia is therefore a multicultural nation consisting of these three main ethnic groups. Islam is the official religion as laid down in the constitution, but because freedom of religion is guaranteed, Malaysia is a country of religious diversity. Malays are generally Muslims, the ethnic Chinese adhere to Buddhism or Taoism, and most of the Indian population belongs to the Hindu or Sikh religion.

Along with Singapore, Malaysia could be regarded as an exemplary model among ASEAN nations. For the past thirty years Malaysia has pursued industrialization and has modernized production methods through proactive policies to woo foreign investment. By these means Malaysia has achieved sustained economic growth. In particular, during the decade since 1988, economic growth continued at a remarkable annual rate of nearly 8 percent. Following the Asian currency and economic crisis which began in the summer of 1997, Malaysia experienced negative growth in 1998 for the first time in thirteen years. However, it has already weathered the worst of the crisis by adopting its own capital and foreign exchange controls and is expected to regain positive growth in fiscal 1999. Malaysia's current gross domestic product (GDP) is over US$4,000 per capita, far surpassing its Southeast Asian neighbors.

This success has been achieved by economic policies that promote massive direct investment from Japan, the United States and Europe and by the development of export-oriented industries. These policies, put in place during the years of political stability under current Prime Minister Mahathir Mohamad's United Malays National Organization (UMNO), have enabled Malaysia to overcome the constraints of having a smaller population than neighboring countries and a multi-racial, multi-religious society.

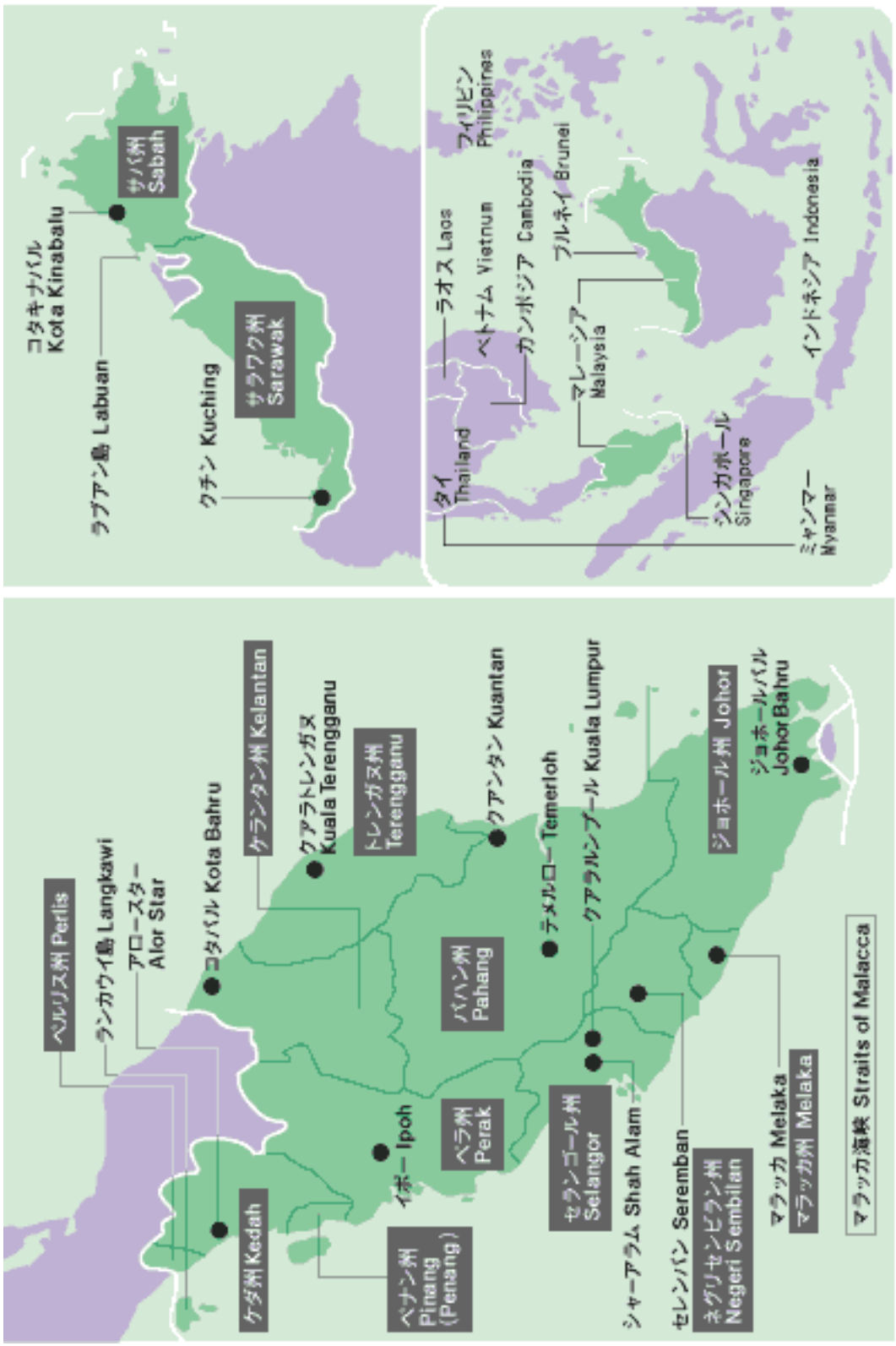
Economic interests are pivotal to Japan's relationship with Malaysia today, but contact between the two countries goes a long way back. The earliest trace of Japanese presence in Malaysia is a record stating that a Japanese Buddhist monk, Shinnyo, died at Johor Bahru while on a pilgrimage to India in the 9th century. In the 16th century, Japanese merchants began trading with Malaysia using licensed merchant ships called "goshuin-sen." There is also a history that a large number of Japanese young women migrated to the Malay Peninsula in the Meiji and Taisho Periods. They were called "karayuki-san."

Bilateral relations began in earnest at the beginning of World War II. A British colony at the time, Malaysia was occupied by the Japanese army in December 1941. For the next three years and eight months, until Japan was defeated in August 1945, Malaysia was under Japanese military rule.

After the war, economic and trading relations between Japan and Malaysia have grown steadily closer as time goes on, because of increasing direct investment from Japan and the large numbers of Japanese companies that have located offshore operations in Malaysia. Japan is currently the largest supplier of imports into Malaysia, and ranks fourth after Singapore, the United States, and the European Union as an export market for Malaysian products. Japanese companies make the highest monetary investment in Malaysia, along with Singapore and the United States. This type of economic relationship will likely continue into the future.

Against this background of close economic ties, opportunity for contact between Japan and Malaysia at the personal level has grown significantly. The number of Japanese visitors to Malaysia exceeds 350,000 per annum. Commercial interests are not the only reason for travel to Malaysia; increasing numbers of Japanese tourists visit the beach resorts of Penang and Langkawi Island. There are now about 20,000 Japanese residents in Malaysia, and the Japanese department stores and supermarkets springing up in Kuala Lumpur and its outskirts are evidence of the close relationship between the two countries.

Figure 1-1-1 Map of Malaysia



2. Malaysia Survives the Currency and Economic Crisis

As discussed in the previous section, Malaysia has maintained steady economic growth since the late 1980s. In February 1991, the Malaysia government announced a new national strategy "Wawasan 2020" (Vision 2020) aimed at making Malaysia an advanced industrialized nation by the year 2020, not only in economic terms but encompassing political stability, social justice and other aspirations. Since then Malaysia has pursued socio-economic development on a number of fronts, such as construction of expressway networks and other infrastructure projects, and development of the Multimedia Super Corridor Project which envisions construction of a new city in an area southwest of Kuala Lumpur, featuring an advanced information network based on fiber-optic cables.

However, Malaysia was hard hit economically by the Asian currency and economic crisis that began in the summer of 1997. The initial response of the Malaysian government was to instigate policies of extreme fiscal austerity and high interest rates, the same policies imposed by the International Monetary Fund (IMF) in Thailand and elsewhere. Malaysia hoped to ride out the crisis by these means, but consumption and investment lost steam and the business climate rapidly deteriorated. Consequently, in September 1998 the Malaysian government suddenly implemented capital controls. The key policies included banning overseas trading of the ringgit, prohibiting people from transferring proceeds from stock sales to other countries, and pegging the currency at a fixed rate of 3.8 ringgit to one U.S. dollar. These drastic measures, by which Malaysia effectively insulated itself financially from other countries, astonished the world. However, roughly one year later, in the summer of 1999, Malaysia's gross domestic product (GDP) swung back to a positive growth rate for the first time in 18 months, prompting Prime Minister Mahathir to declare victory for his controversial economic policies. Accordingly, the federal government's draft budget for fiscal 2000, presented to the parliament by the Malaysian government at the end of October 1999, was an economic stimulus package that predicted 5 percent growth in GDP for fiscal 2000, an increase of 3.5 percent from the previous year, which was focused on getting economic development firmly on track.

Despite a number of factors that cast some doubt on whether economic recovery can be achieved in the future – the slow recovery in domestic consumption, the slump in foreign direct investment, and the reliance on government projects to stimulate demand, for example – Malaysia appears to have more or less overcome the currency and economic crisis and is well set on the road to recovery.

However, Malaysia's rapid economic growth has stemmed from Japanese companies and other foreign firms locating their facilities in Malaysia, and from the concomitant rapid increase in foreign direct investment. Moreover, since Malaysia exports goods to an amount roughly equivalent to its GDP, with Japanese and other foreign affiliates accounting for 70 percent of its exports, it is inevitably dependent on overseas funding and technical expertise. For these reasons, Japanese companies established in Malaysia and intimately involved in the Malaysian economy have a major role to play in helping Malaysia to fully surmount the currency and economic crisis and in building even closer bilateral relations. The efforts of Japanese companies to engage cooperatively across all fronts, including environmental concerns, and to transfer capital, technology, and know-how to Malaysia is of growing importance.

3. Japanese Involvement in Malaysia with Electronics Sector at the Forefront

The influx of Japanese companies into Malaysia has been remarkable. Within Southeast Asia, the number of Japanese companies now conducting thriving businesses in Malaysia, primarily in the export-oriented electrical and electronic sectors of the manufacturing industry, is second only to the number of Japanese companies operating in Thailand.

Japanese companies began setting up their plants in Malaysia well over 30 years ago. This was the time when Japan provided its first loan package to Malaysia. It was also when the Malaysia government launched its export-oriented industrialization program, setting in train a series of measures such as the Investment Incentives Act 1968, aimed at attracting foreign funds, and the establishment of Malaysia's

first Free Trade Zones (FTZs) in 1971. FTZs were set up in 12 locations nationwide initially, and a succession of Japanese companies, primarily in the electrical sector, along with U.S. companies, took the opportunity of locating production bases in Malaysia. In 1981 Prime Minister Mahathir enunciated his "Look East" policy which called for Malaysia to model its economic development on the East Asian nations of Japan and South Korea. In 1986 the government formulated policies such as lifting the restrictions on 100-percent foreign ownership in export industries and high-tech industries. The weakening of the U.S. dollar against the yen in the wake of the Plaza Accord of 1985 brought a surge of plant relocation to offshore sites, and many of the relocating Japanese companies chose to build their plants in Malaysia. Another next major influx was fueled by the continuing appreciation of yen from the second half of 1993.

There are a number of reasons why Japanese companies choose to operate in Malaysia. Among the reasons are:

1. Political and social stability
2. Proactive government policies that reward foreign investment
3. Well-established transportation system and other infrastructures
4. Modern judicial system as a legacy of British colonialism
5. Highly capable work force, characterized by national traits of hard work and a strong sense of responsibility
6. Widespread English education system, enabling foreign companies to communicate with local employees in English

The main attraction for Japanese companies, however, is the sense of political and social stability in Malaysia since the race riots that broke out in 1969, and the sense of reassurance given by the tax exemptions and other government incentives allowed to foreign-owned companies which support economic growth.

The Japan External Trade Organization (JETRO) carries out an annual survey of the number of operations established by Japanese companies in Malaysia. As of May 1997, there were 1,378 operations. Of these, 755 (more than half of the total) were manufacturing plants and 623 were non-manufacturing facilities such as commercial and trading bases, sales centers, and construction companies. The number of Japanese operations in Malaysia has been steadily rising. Taking just the manufacturing industry, which was the main focus of our research, the number of operations has risen from 367 in 1991, to 533 in 1993, 596 in 1995, and 722 in 1996. Malaysia is called "Asia's electrical appliance factory" and the "semiconductor peninsula." Indeed, electronic products account for more than half of Malaysia's total exports. A feature of Japanese industries in Malaysia is that the proportion of electrical and electronic manufacturers among them is higher than among Japanese companies operating in other Southeast Asian nations. The JETRO survey corroborates the trend, showing that 322 or roughly 43 percent of the 755 manufacturing facilities counted in the 1997 survey were electrical and electronic-related industries.

The same trend can be observed among the members of the Japanese Chamber of Trade and Industry in Malaysia (JACTIM), to which many Japanese companies in Malaysia belong. The total JACTIM membership as of September 1999 stood at approximately 530 companies, of which more than half are manufacturers and approximately one quarter are manufacturers in the electrical and electronic sector.

In our field research too, all of the companies who agreed to participate were manufacturing industries. This is why the 13 case studies presented in Chapter 2 as specific examples of corporate environmental practices are all from the manufacturing industry and mostly from the electrical and electronic sector.

Economic development in Malaysia has tended to concentrate along the west coast of the Malay Peninsula and in the southern area near Singapore. Japanese manufacturers have also tended to locate their plants in these areas. Over 70 percent of all Japanese manufacturers are located in the three states of Selangor, which neighbors on the capital Kuala Lumpur; Johor, which borders on Singapore; and

Penang in the north. As an emerging trend, a growing number of companies are locating their plants in the state of Negeri Sembilan to the south of Selangor, or are choosing to locate away from the Kuala Lumpur capital region when building a new plant.

In recent years, however, the outflow of manufacturers from Japan to Malaysia has leveled off because of rising labor costs, labor shortages, and an increasing number of Japanese companies choosing to locate in China and other countries rather than Malaysia. On the other hand, the number of service industries, such as transportation and distribution, that are establishing bases in Malaysia, is gradually increasing. Among manufacturing industries, well-known large Japanese corporations were predominant in the past, but nowadays an increasing number of relatively small-scale parts manufacturers are moving into Malaysia as their big corporate clients set up production bases there.

Malaysia is host to numerous other foreign companies, as well as to Japanese companies. Statistics on the number of approved foreign investment projects by country in 1996 and 1997 show that, excluding Singapore, Malaysia's nearest neighbor, Japan had the highest number of investment projects, followed by Taiwan, the United States, Germany, Hong Kong, and the United Kingdom, in that order. That is, Japan is the most influential foreign investor in Malaysia. As of 1997, a total of 31 semiconductor companies had a presence in Malaysia. This figure breaks down to ten U.S. companies, nine Japanese companies, five European companies, and just four locally financed companies. An overwhelming proportion of the companies in the electrical and electronic sector are foreign companies.

However, the downside of Malaysia's rapid economic development, achieved over a short period of less than two decades, is a host of environmental pollution problems which are now of serious public concern. In response to these problems, the Malaysian government is intent on making environmental laws and regulations more effective so as to give greater clout to its environmental programs. Malaysia is rolling out a series of environmental initiatives that are more advanced than in the past, such as the completion of a large-scale treatment facility for scheduled wastes, in order to promote efforts to deal with industrial waste which has lately become a major environmental issue. The thrust of environmental administration is shifting from regulatory controls alone to instituting preventive environmental measures to forestall pollution.

Every ten years Malaysia draws up an Industrial Master Plan (IMP) as the basis of its national industrial policies. The Second Industrial Master Plan (IMP2: 1996 to 2005) which is now in effect appraises the First Industrial Master Plan (IMP1: 1986 to 1995) and acknowledges the benefits gained from export-oriented industrial revitalization based on direct investment from other countries. But it also argues that IMP1 did not produce effective industrial linkage between foreign affiliates and local companies. This verdict presumably applies not only to industrial matters, but equally to environmental concerns.

Given this background, there is mounting public interest in the efforts of Japanese companies to prevent pollution, since these companies are also the driving force behind Malaysian industry. Japanese companies are expected not only to keep up serious efforts to combat environmental pollution, but also to take a proactive stance in making their technical expertise available to Malaysia. The expectation is that knowledge transfer by Japanese companies will not be limited to pollution control technology, but will extend to innovative environmental practices and related technologies, such as the setting up of an environmental management system.

Section 2
Current Environmental Issues in Malaysia

1. Pollution Problems Beginning from Traditional Industries

Environmental pollution problems in Malaysia have a long history. River pollution by mine wastewater and sludge began with the rapid development of tin mining, a traditional industry that started at the turn of the century about 100 years ago. In later years, other traditional industries such as natural rubber and palm oil production began in earnest, and wastewater from the factories caused further pollution of rivers and seas. From the late 1960s, Malaysia pursued rapid industrialization supported by foreign investment, but the result of industrialization was a raft of pollution problems, caused by industrial wastewater and other wastes, which became very apparent from the 1970s. In recent years, air pollution caused by the tremendous increase in road traffic that has accompanied economic development, and water pollution from household wastewater, have become obvious problems that particularly affect urban areas. Another recent problem is haze (smoke and fog caused by particulate matter), which occurred on a large scale for several months in 1997 and caused respiratory complaints and other health problems in the community. In this incident, the haze was caused by the huge forest fires on Kalimantan Island and in other parts of Indonesia, across the sea from Malaysia. It is therefore a unique environmental problem that will not be easy to solve. Other problems noted in Malaysia are oil pollution of the sea and deforestation due to regional development of various kinds.

Although Malaysia has a host of environmental problems that demand solution, including those associated with scheduled wastes, the government is implementing more effective pollution controls than other Southeast Asian nations. It is also committing resources to construction of environmental infrastructures, such as sewerage systems to deal with household wastewater. Given these positive moves, environmental problems in Malaysia do not appear to be as grave as in the Philippines, Indonesia and Thailand which were covered in our previous surveys.

2. Water Pollution Problems

Water pollution is arguably the most fundamental environmental issue in Malaysia, since the country's pollution problems began with water pollution caused by the three traditional industries of tin mining, natural rubber, and palm oil, as mentioned above. The government's environmental programs therefore give high priority to control of water pollution.

Malaysia does not publish exact values of river water quality measurements for individual monitoring sites. Instead, water quality status is published under three rankings (clean, slightly polluted, and polluted), using a Water Quality Index (WQI) based on six parameters: pH, dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), ammonia nitrogen, and suspended solids (SS).

At present, water quality is monitored regularly at 908 sites on the 117 rivers in the country. Looking at results for 1997, which are the most recent published data, 24 of the 117 rivers were classified as clean, 68 as slightly polluted, and 25 as polluted. Comparing these results with the previous year (1996), the number of polluted rivers increased from 13 to 25, and the number of slightly polluted rivers increased from 61 to 68. Low rainfall, which resulted in reduced flow rates in the rivers, was cited as one of the reasons for the increased pollution. Sources of pollution identified as contributing to BOD loading include the agriculture-based industries (natural rubber and palm oil production, for instance), manufacturing industry, and livestock industry. Similarly, the livestock industry and domestic wastewater are cited as causes of worsening ammonia nitrogen pollution, and civil engineering works and land cultivation are blamed for the deterioration in SS status. Overall trends, however, if weather conditions and other such factors are excluded, show an improvement in river water quality brought about by Malaysia's adoption of wastewater regulations and development of sewerage systems.

In addition, the 1997 results identify a total of 4,932 factories as sources of river water pollution. By industry type, the polluters included 966 food and beverage manufacturing factories (20%), 559 paper factories (11%), and 419 electrical and electronics plants (8%). The breakdown by state shows that Selangor had the highest number of industrial sources of pollution (1,668 factories), followed by Johor

(945) and Negeri Sembilan (371). In terms of individual rivers, the basin of the Klang River which flows through Selangor had the highest number of industrial pollution sources.

Rivers in Malaysia generally appear to have high organic pollution loads and high SS concentrations. However, because water pollution status is published as an index (WQI), we were unable to obtain accurate information about concentrations of river pollutants over recent years for this research. Nor could we get a precise picture of the severity of river pollution in Malaysia.

In moves to solve these water pollution problems, Malaysia is putting sewerage services in place to deal with household wastewater which is a leading source of pollution. Unlike sewerage systems in Japan, the projected wastewater treatment systems will handle household wastewater only. In 1993, Malaysia passed the Sewerage Service Act, paving the way for privatizing the sewerage systems. The task of privatization was undertaken by Indah Water Konsortium Sdn. Bhd., which aims to deliver services to 79 percent of the population within the year 2000.

In regard to marine pollution, 794 samples were collected and analyzed from 226 locations in 1997. Of these, 87 monitored locations, or 34 percent of the total, were found to have contaminant levels exceeding the Proposed Marine Interim Standards. Oil and grease exceeded the limit (0 mg/l), as did total suspended solids (50 mg/l), and coliform bacteria (100 MPN/100ml). Detected copper levels were above the Proposed Marine Interim Standard (0.1 mg/l) in Sarawak, and mercury and arsenic exceeded the limits (0.001 mg/l and 0. 1 mg/l, respectively) in Negeri Sembilan.

In 1996 the Malaysia government began monitoring groundwater in the Malay Peninsula with the aim of preventing possible contamination. No contamination has been detected to date.

3. Air Pollution Problems

Air pollution in Malaysia falls into three main categories: air pollution due to exhaust gas from mobile emission sources such as motor vehicles, principally in urban areas; haze caused by the weather and by forest fires in neighboring Indonesia; and pollution caused by industrial activities.

Of these three problems, air pollution from mobile emission sources is of greatest concern. In 1997, there were roughly 8.5 million registered motor vehicles in Malaysia, climbing at the rate of 10 percent or more every year. According to 1997 figures, the estimated quantities of air pollutants released by these vehicles were 1.9 million tons of carbon monoxide (CO), 224,000 tons of nitrogen oxides (NO_X), 101,000 tons of hydrocarbons (HC), 36,000 tons of sulfur dioxide (SO_2) and 16,000 tons of particulate matter. Mean values for the years 1993 to 1997 show that the amount of air pollutants from mobile emission sources accounts for 81 percent of all air pollution occurring in Malaysia. The problem will clearly become even more critical as the number of motor vehicles keeps on increasing.

As a result of these forms of pollution, Kuala Lumpur and its outskirts, which have heavy motor vehicle traffic, are exposed to high levels of NO_X and SO_2, and of particulate matter measured as PM10. Air pollution due to particulate matter, although still below the environmental standard at present, is growing more severe as time goes on.

Another problem is black smoke from diesel motor vehicles, the subject of numerous complaints from the public. In response, the government has launched a campaign to crack down on vehicles that violate the regulations. In regard to lead pollution, the government in 1991 introduced incentives to use unleaded gasoline, and since 1996 it has been obligatory for gasoline-fueled vehicles to have catalytic converters. These policies have been successful in reducing the level of lead in the atmosphere year by year.

Haze is another major problem in Malaysia. There were minor haze incidents in 1993 and 1994, years that recorded low rainfall, but haze on an unprecedented scale occurred from the summer of 1997 due to the huge forest fires that blazed in Sumatra and Kalimantan in Indonesia. The haze that year continued for five months, from mid-July to November. In late September, when the haze was most severe, air

pollution readings in Sarawak exceeded the "hazardous" level of 500 on the Air Pollutant Index (API). As well as affecting health and causing an increase in respiratory complaints, the 1997 haze incident had major economic costs, impacting on transportation services, tourism, and the fishing industry among others. The disaster prompted the government to subsequently ban all open burning within Malaysia.

Air pollution caused by industrial activities is still low in Malaysia. Including both industrial fuels and industrial processes, the industrial sector contributes only 7 to 8 percent of total air pollution in the country. Except for special industries such as quarry and rubber production, industrial activities are not a major factor.

There are currently 29 air quality monitoring stations in Malaysia, continuously taking air pollution readings. As with water quality, the results are published according to an API. The API consists of five parameters (PM10, CO, NO, SO_2, and ozone (O_3)), and readings are classified in five rankings (good, moderate, unhealthy, very unhealthy and hazardous).

As measured by the API, air pollution nationally was at good to moderate levels in 1997, except in September when particulate matter was at high concentrations because of the haze, and air pollution was not a particular problem. Readings for the five substances used as parameters were also below the air quality standards, except for PM10 levels around September.

4. Waste Problems

Industrial waste is the greatest environmental dilemma affecting Japanese companies and all those conducting industrial activities in Malaysia. Until 1997 Malaysia still had no approved final disposal facilities, as prescribed in the legislation, for dealing with the scheduled wastes defined in the set of regulations and orders enacted in 1989. For nearly a decade, Japanese companies had to go to great lengths, storing scheduled wastes on-site, for example, if they wanted to deal with their wastes in compliance with the law.

Scheduled wastes cover a wide range of industrial wastes. They include not only hazardous and dangerous substances but also sludge generated by general manufacturing processes and wastewater treatment. The volume of scheduled wastes generated in Malaysia is increasing every year as industrial activity booms. According to the Department of Environment (DOE) statistics, the volume rose from about 420,000 tons in 1994 to 630,000 tons in 1996. In 1997, the volume of scheduled wastes fell to 280,000 tons, partly because of changes in statistical techniques, but also because of the advent of the currency and economic crisis. The volume is predicted to rise again, however, when the economy rebounds. According to 1997 figures, the chemical, textile, and metal working industries generated a large amount of scheduled wastes, and various types of sludge and acid wastes accounted for more than half of the generated wastes.

However, because Malaysia still has only one final disposal facility and the disposal costs are relatively high even in comparison with Japan, illegal dumping is an ongoing problem and incidents of illegal dumping make major news stories from time to time in the newspapers and other media.

Scheduled wastes are given high priority in Malaysia's environmental programs and penalties for illegal dumping are quite strictly enforced. There are frequent court cases about illegal dumping, and the waste disposal issue will likely be a headache in future years for Japanese companies and for other foreign companies operating in Malaysia.

In the past, foreign companies and other enterprises that were unable to store their scheduled wastes on-site sometimes exported them for resource recovery or reuse. However, in 1993 Malaysia ratified the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes, and since then the government has taken an increasingly strict approach to the export of scheduled wastes. In 1997 there were 58 applications to export scheduled wastes, including 18 outstanding cases, but only 12 were approved within the year, and waste export is no longer allowed unless for resource recovery under the

strictest criteria. In 1996 Malaysia drew up guidelines on transboundary waste movements with its nearest neighbor, Singapore, a country closely involved with Malaysia in regard to the flow of goods and materials.

Wastes other than scheduled wastes are treated and disposed of by private recycling and treatment companies under contract with the industrial or commercial concern that generated the waste. However, the wastes that remain after salvaging materials of value – plastics, cardboard and metal, for example – mostly goes to landfills.

Local authorities used to be responsible for collecting, treating, and disposing of municipal wastes, but in recent years there have been concerted moves to transfer the operation to privatized companies in which the state government and private sector both have a stake. The country has been divided into four regions, each with a private waste management operator already established. Municipal wastes are disposed of by landfill without any intermediate treatment, and most of the landfill is carried out by open dumping.

Specialist private operations have been set up to handle medical waste and other special wastes.

5. Other Environmental Problems

The various forms of development in Malaysia have resulted in deforestation, soil erosion, species endangering, and a raft of other problems of the natural environment and ecosystem. In relation to industrial activities, however, noise can be cited as a particular problem. Malaysia currently has regulations governing motor vehicle noise, but there are no specific regulations about general factory noise other than in the work environment. However, the Environment Quality Act 1974 has a section on noise controls, and the government is drafting further regulations. Monitoring of noise levels in the vicinity of factories and construction sites has also begun, following complaints from local residents.

Malaysia is also taking steps toward eliminating specific chlorofluorocarbons in order to protect the ozone layer. A unit of Montreal Protocol for protection of the ozone layer was set up in the Department of Environment (DOE) in January 1997, and a project for phasing out ozone depleting substances, supported by a grant from the Multilateral Fund of the Montreal Protocol, is now underway with the participation of several dozen companies. In addition, the problem of global warming comes under the jurisdiction of the Malaysia Meteorological Service, rather than the DOE. Approaches to this problem from the perspective of energy policies come under the Ministry of Energy, Communications and Multimedia, which is promoting the use of natural gas as an energy source.

Section 3
Environmental Administration and Legislation in Malaysia

1. Development of Environmental Administrative Framework and Legislative System

(1) Development of Environmental Policies and Environmental Quality Act 1974

Faced with worsening water pollution caused by the three traditional industries of tin mining, natural rubber, and palm oil on the one hand, and by new industrial pollution on the other, brought about by industrialization policies pursued since the late 1960s and fostered by foreign capital inflow, Malaysia in 1974 enacted its first framework environmental legislation in the form of the Environmental Quality Act 1974. In passing this law, Malaysia embarked on a committed program to control industrial pollution, including wastewater which was not previously regulated, air pollution from factories, and solid waste problems. In the same year, the Department of Environment (DOE), which is charged with environmental administration, was set up within the Ministry of Science, Technology and Environment (MOSTE).

Every five years Malaysia formulates a Malaysia Plan (MP) which provides a road map of socio-economic policies. The Third Malaysia Plan, covering the years 1976 to 1980, was the first to incorporate an environmental policy aimed at integrating environmental concerns into development planning. Since then, with the Fifth Malaysia Plan (1986-1990) and Sixth Malaysia Plan (1991-1995), the government has made its environmental policies more substantial and concrete. The current Seventh Malaysia Plan (1996-2000) states that the objectives of Malaysia's national environmental policies are to achieve a clean, safe, and healthy living environment for current and future generations, and to promote lifestyles and modes of production and consumption consistent with the principles of sustainable development. As cited in the plan, the main thrust of specific policies based on these objectives include (1) improvement of air pollution and river water quality, (2) appropriate treatment of solid waste, (3) promotion of energy saving and use of new energy, and (4) incorporation of environmental considerations in land use planning. The overall direction of the Seventh Malaysia Plan, then, is to enhance the nation's environmental policies in order to reconcile the interests of development and the environment.

During the quarter of a century since the Environmental Quality Act was passed, the Malaysian economy has achieved rapid growth. The industrial structure has altered considerably with the development of the electrical and electronic industry, the increase in small to mid-size companies that supply goods and services to large corporations, and the expansion of other general support industries. Along with these changes, environmental issues have gained far greater exposure than before. Malaysia now faces a diverse range of environmental issues, such as hazardous and toxic waste problems and air pollution in addition to water pollution which was the major concern when the Act was passed. As a result, the government needed to implement inter-agency environmental regulations that would cut across bureaucratic lines, and to formulate policies for preventing, rather than curing, environmental pollution. In fact, the 1974 Act has been amended three times since it was first enacted. Preventive measures, in the form of environmental impact assessment, were introduced in the 1985 amendment.

Currently, while seeking to get tough on violations of the various environmental regulations, the DOE is implementing progressive environmental programs that emphasize pollution prevention. New initiatives taken by the DOE include the establishment of the Environmental Fund, promotion of environmental management systems, adoption of environmental audits, and introduction of new regulations for controlling chemical substances. Malaysia also has an active privatization program in various sectors, aimed at solving the current shortage of human and technical resources in state enterprises, while also improving management efficiency. The environmental sector is no exception, with privatization already underway in areas such as sewage treatment, scheduled waste disposal facilities, and pollution monitoring. Malaysia is keen to utilize skills in the private sector through other initiatives too, such as the introduction of a registration system for environmental consultants for carrying out environmental impact assessment. Among other such moves are the promulgation of the ISO 14001 international environmental management standard through the Standard and Industrial Research Institute of Malaysia (SIRIM), a joint public-private sector organization, and dissemination of environmental information through the Environmental Management and Research Association of Malaysia (ENSEARCH), an environmental non-governmental organization (NGO).

(2) Environmental Administrative Framework and the Department of Environment

The supervisory agency in charge of environmental administration in Malaysia is the Department of Environment (DOE) which was established in 1975 under the provisions of the Environmental Quality Act 1974. Under Malaysia's administrative framework, the DOE belongs to the Ministry of Science, Technology and Environment (MOSTE), but it is a highly independent organization. With a staff of nearly 500 and local offices throughout the country, the DOE has a similar setup to the Environment Agency in Japan. The DOE has comprehensive jurisdiction over environmental administration related to industrial activities and is charged with formulating environmental rules and regulations; enforcing legislation and carrying out monitoring in relation to water pollution, air pollution, and hazardous substances; conducting environmental impact assessment of proposed development projects; and carrying out Site Suitability Evaluation of proposed factories. The Environmental Quality Act 1974 grants wide powers to the Director General of the DOE in order to promote environmental programs.

The DOE headquarters (HQ) in Kuala Lumpur has five divisions: Administration Division, Information System and Technology Division, Control Division, Development and Planning Division, and Environmental Assessment Division. The DOE has a total of 13 State Offices in 12 states (excluding the small state of Perlis) and in the Kuala Lumpur federal territory, and two Regional Offices (one on Langkawi island and the other in Temerloh in the large state of Pahang). It also has an office called the Environmental Advisory Office in the head office of the Malaysian Industrial Development Authority (MIDA), which serves as the investment contact agency for foreign manufacturing companies. Of the 500 people employed by the DOE as of 1997, around 100 are control officers and expert officials empowered to carry out on-site inspection.

The DOE organizations of particular relevance to Japanese companies are the Enforcement Section and Monitoring Section in the Control Division of DOE HQ, which oversee the various environmental regulations; the Environmental Assessment Division, which administers the environmental impact assessment system; and the State Offices and Regional Offices, which have jurisdiction over the states or regions in which factories are located.

State Offices and Regional Offices, as well as carrying out monitoring of rivers and the atmosphere, are tasked with inspecting development project sites, actually regulating the wastewater, emissions, and solid wastes discharged from factories, and prosecuting offenses discovered by on-site inspection. Since the State Office is the government agency through which a company carries out standard formalities and other matters relating to environmental regulations, the State Office for the area in which a Japanese company is located is closely involved with that company's activities. For the purposes of this research, we visited the DOE State Office in Selangor, adjacent to Kuala Lumpur, which employs 43 people (18 of whom are control officers). The staff are engaged in administering environmental controls, particularly in regard to wastewater and scheduled wastes, by means such as on-site inspection of factories, which apparently number around 5,000 in Selangor. The Selangor State Office is the largest in the country, but we were told that it is chronically short-staffed.

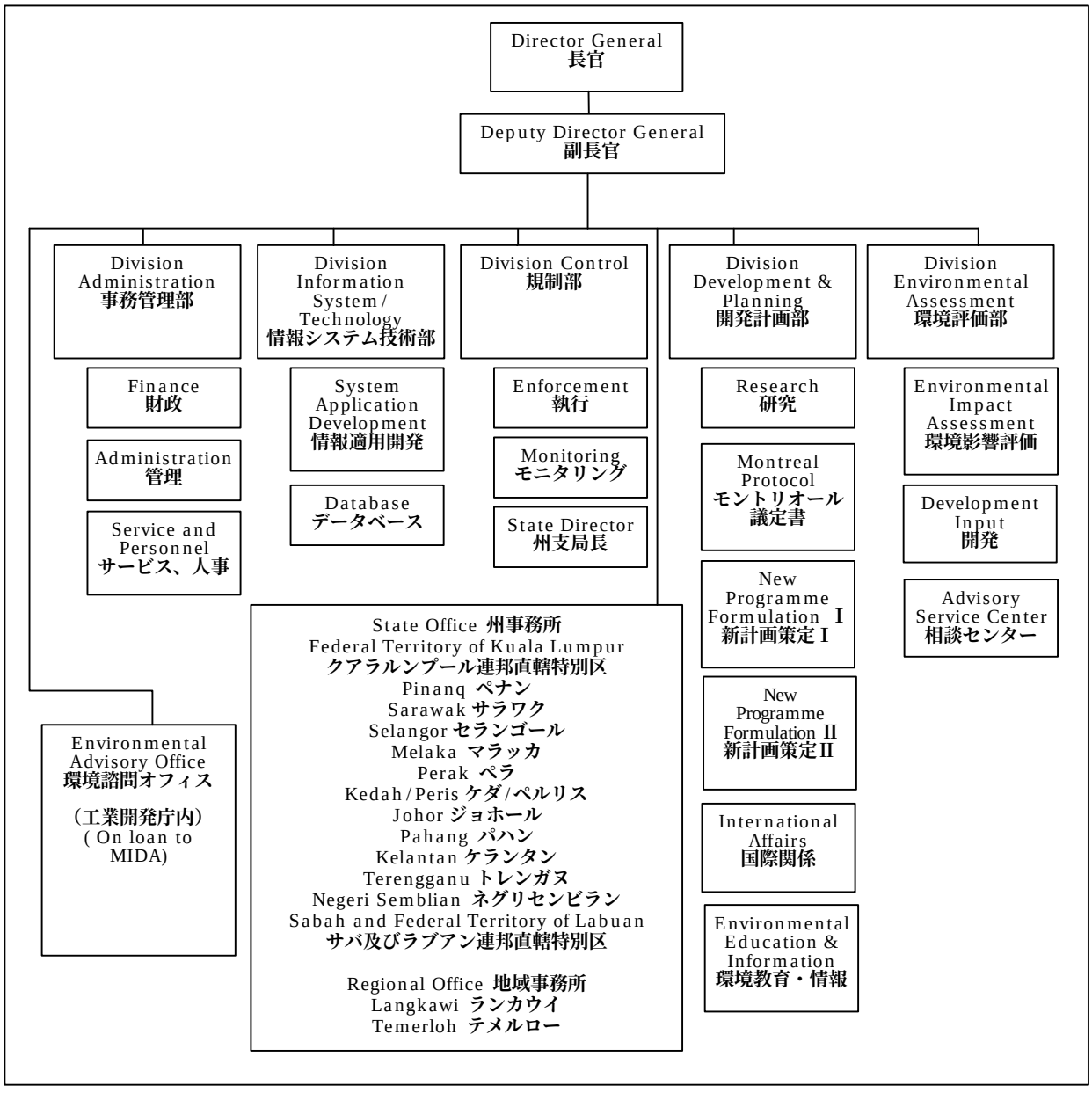
Another environmental administrative organization in Malaysia is the Environmental Quality Council. It has the office within the DOE, and its role is to advise and provide guidance to the Minister of Science, Technology and Environment. The council membership is made up of the directors of environment-related ministries such as the Ministry of Agriculture and Ministry of Transport, industry representatives from traditional industries such as palm oil production and from other industries, academics, representatives of nature conservation groups, and representatives of the state governments of Sabah and Sarawak in remote East Malaysia. The council members in 1997 advised the government on introducing controls for chemical substances and factory noise and on amending regulations relating to scheduled wastes.

Other central government agencies with administrative responsibilities in specific areas of environmental protection include the Department of Forest in the Ministry of Primary Industries (forest conservation), the Department of Wildlife and National Parks in MOSTE (wildlife protection), and the Marine

Department in the Ministry of Transport (marine pollution). However, the DOE has full jurisdiction over all issues that relate to industrial pollution.

Malaysia's local government administrative structures include, in addition to the state government, districts (Dearah) and towns (Mukim) as administrative units within states. The state governments have authority over matters relating to land use, agriculture, forestry, fishery, water resources, and so on, but the federal government has authority in regard to environmental affairs. Consequently, except for Sarawak, there is no department or office dealing with environmental issues within the state governments, and the DOE State Office in each area handles environmental controls and all other environmental administrative matters. Even the Sarawak state government, although it has its own environmental department, is restricted to handling environmental issues only insofar as they relate to agriculture. The collection, treatment and disposal of municipal waste also come under local government administration.

Figure 1-3-1 Organizational Structure of DOE



(3) Framework Environmental Legislation on Industrial Pollution

Malaysia's system of environmental legislation is based on the Environmental Quality Act (EQA) 1974, which was introduced in 1974 and came into force in 1975. From 1957 when the country gained independence from Britain until enactment of the EQA 1974, Malaysia had no fundamental laws relating to environmental controls and used separate pieces of legislation, such as the Forest Enactment, Mining Enactment, and Waters Enactment, to deal with environmental issues. However, the intent of these laws was not to protect the environment. Also, since authority was vested across a large number of government agencies, it was difficult to implement comprehensive environmental policies. During the same period, however, in addition to the pollution problems caused by traditional industries such as palm oil production, rapid industrialization resulted in aggravated industrial pollution and there were ongoing demands for a new legal framework that would enable comprehensive environmental controls to be developed. This was the background that led to the formulation of the EQA 1974. It can be said that Malaysia began to put in place the framework environmental legislation relatively early compared with other Southeast Asian nations.

The EQA 1974 gives broad powers to the Director General of the DOE, including the authority to oversee environmental regulations in general and to make proposals regarding law enforcement, to issue various licenses for preventing discharge of pollutants, and to monitor and prosecute cases of non-compliance with the regulations. In addition, the EQA 1974 provides for the establishment of the Environmental Quality Council as a national advisory body for environmental issues in Malaysia. It also provides for the approval and licensing of prescribed projects that are subject to environmental regulations, and states that no person shall cause air pollution, noise, or contamination of inland waters or coastal waters by contravening stipulated limits. In regard to scheduled wastes, the EQA 1974 prohibits disposal and transport without the prior approval of the Director General of the DOE. Further, while providing for punishment and compound or a simplified administrative fine system for contravention of environmental regulations, the EQA 1974 incorporates forward-looking provisions to enable implementation of new environmental policies. These measures include the Environmental Fund, which is now under consideration for future introduction, labeling of approved environment-friendly products, and a deposit system to promote recycling.

Following its enactment, the EQA 1974 was amended three times, in 1985, 1996 and 1998, following changes in Malaysia's environmental status. The 1985 amendment, in response to growing public concern about destruction of the natural environment by development activities, introduced the environmental impact assessment (EIA) system for large-scale development projects as a means of preventing environmental destruction. The 1996 amendment increased fines and penalties for non-compliance with environmental regulations in response to an upsurge in environmental offenses as Malaysia continued its rapid economic growth. The stiffer penalties prescribed in the 1996 amendment include increasing the term of imprisonment for offenses involving scheduled wastes from two years to five years, and the maximum fine from 10,000 to 500,000 ringgit. The 1998 amendment incorporates a complete ban on "open burning" (outdoor incineration) because of the major haze incidents occurring in Malaysia.

At present, Malaysia's environmental controls for industrial pollution consist of a raft of regulations and orders, formulated separately for each prescribed activity under the provisions of the EQA, plus a number of guidelines. The specific contents of this legislation, such as emission standards and other particulars, are set forth in the various regulations drawn up separately for wastewater, air pollution, and so on. There are now 19 such regulations and orders, drawn up one after another under EQA provisions since 1977. Their contents are still being amended in stages to make the regulations stricter.

Figure 1-3-2 Environmental Law and Regulations

Control of Motor Vehicle Emissions / 自動車排ガス規制
Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985 1985 年自動車ガソリン中の鉛化合物規制に関する環境規則
Environmental Quality (Motor Vehicle Noise) Regulations 1987 1987 年自動車騒音等に関する環境規則
Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996 1996 年ディーゼル自動車の排気ガス規制に関する環境規則
Environmental Quality (Control of Emission from Petrol Engines) Regulations 1996 1996 年ガソリン自動車の排気ガス規制に関する環境規則
Integration of Environment and Development / 環境と開発の統合
Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987 (Amendment) 1995 1987 年環境影響評価の対象事業に関する環境命令 1995 年改定
Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order 1977 (Amendment) 1982 1977 年パーム原油の特定施設に関する環境命令 1982 年改定
Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977 1977 年パーム原油の特定施設に関する環境規制
Environmental Quality (Licensing) Regulations 1977 1977 年許認可に関する環境規制
Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Order 1978 (Amendment) 1980 1978 年天然ゴムの特定施設に関する環境命令 1980 年改定
Control of Municipal and Industrial Waste Water Pollution / 排水規制
Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 (Amendment) 1997 1979 年下水・産業排水に関する環境規制 1997 年改定
Control of Toxic and Hazardous Waste / 有害・有毒廃棄物規制
Environmental Quality (Scheduled Wastes) regulations 1989 1989 年指定産業廃棄物に関する環境規則
Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989 1989 年指定産業廃棄物処理・処分設備に関する環境命令
Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Regulations 1989 1989 年指定産業廃棄物処理・処分設備に関する環境規則
Promotion of Investments (Promoted Activities and Products) (Amendment)(No.10) Order 1990 (made under the Promotion of Investments Act, 1986) 1990 年推進事業・製品に関する環境命令 （1986 年投資推進法の下に制定）
Control of Industrial Emissions / 各種の産業排出物規制
Environmental Quality (Clean Air) Regulations 1978 1978 年大気汚染防止に関する環境規制
Environmental Quality (Compounding of Offences) Rules 1978 1978 年罰金等に関する環境規制
Environmental Quality (Delegation of Powers on Marine Pollution Control) Order 1993 (Amendment) 1994 1993 年海水汚染規制に関する環境命令 1994 年改定
Environmental Quality (Prohibition on the Use of Chlorofluorocarbons and other Gases as Propellents and Blowing Agents) Order 1993 1993 年高圧ガス、噴霧ガス用クロロフルオロカーボン類ガスの使用の禁止に関する環境命令
Environmental Quality (Prohibition on the Use of Controlled Substance in Soap, Synthetic Detergent and Other Cleaning Agents) Order 1995 1995 年石鹸・合成洗剤などその他洗浄薬剤中の添加剤の使用禁止に関する環境命令

Source： Brochure published by DOE

The 19 pieces of legislation include regulations on air pollution, wastewater, scheduled wastes, and environmental impact assessment, for example, together with general environmental provisions such as permission to operate a plant, and penalties and fines. In addition, Malaysia's two traditional industries of palm oil and natural rubber production have their own separate regulations and orders with specific

provisions that do not apply to other industries. The legislation for these two industries was formulated earlier than other environmental regulations, which shows that the palm oil and rubber were once major industries and at the same time the greatest polluters.

For Japanese companies, there are three environmental regulations that are particularly pertinent to their day-to-day business activities: the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979, which prescribe industrial effluent standards and so on; the Environmental Quality (Clean Air) Regulations 1978, which prescribe levels of emission from stationary sources; and the Environmental Quality (Scheduled Wastes) Regulations 1989, which list the applicable types of waste and spell out their prescribed method of treatment, disposal, and transportation.

Malaysia's environmental legislation also requires that environmental assessment be carried out, under the provisions of the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987, at the planning stage of plant construction or expansion of an existing facility, if the operation falls within the criteria for prescribed activities.

Other laws related to environmental matters in Malaysia are the National Forest Act 1984, Protection of Wildlife Act 1972, and Town and Country Planning Act 1976, but these laws have no direct effect on the environmental controls affecting the industrial activities of Japanese companies.

In response to the quantitative increase in environmental pollution, Malaysia is stepping up enforcement by gradually introducing stiffer regulatory controls and by expanding and strengthening the structures of environmental administration. It is therefore incumbent upon Japanese companies, particularly those in the manufacturing sector, to properly implement environmental measures to comply with the EQA and with the regulations and orders promulgated by the DOE under EQA provisions.

(4) Environmental Requirements for Industrial Operations in Malaysia

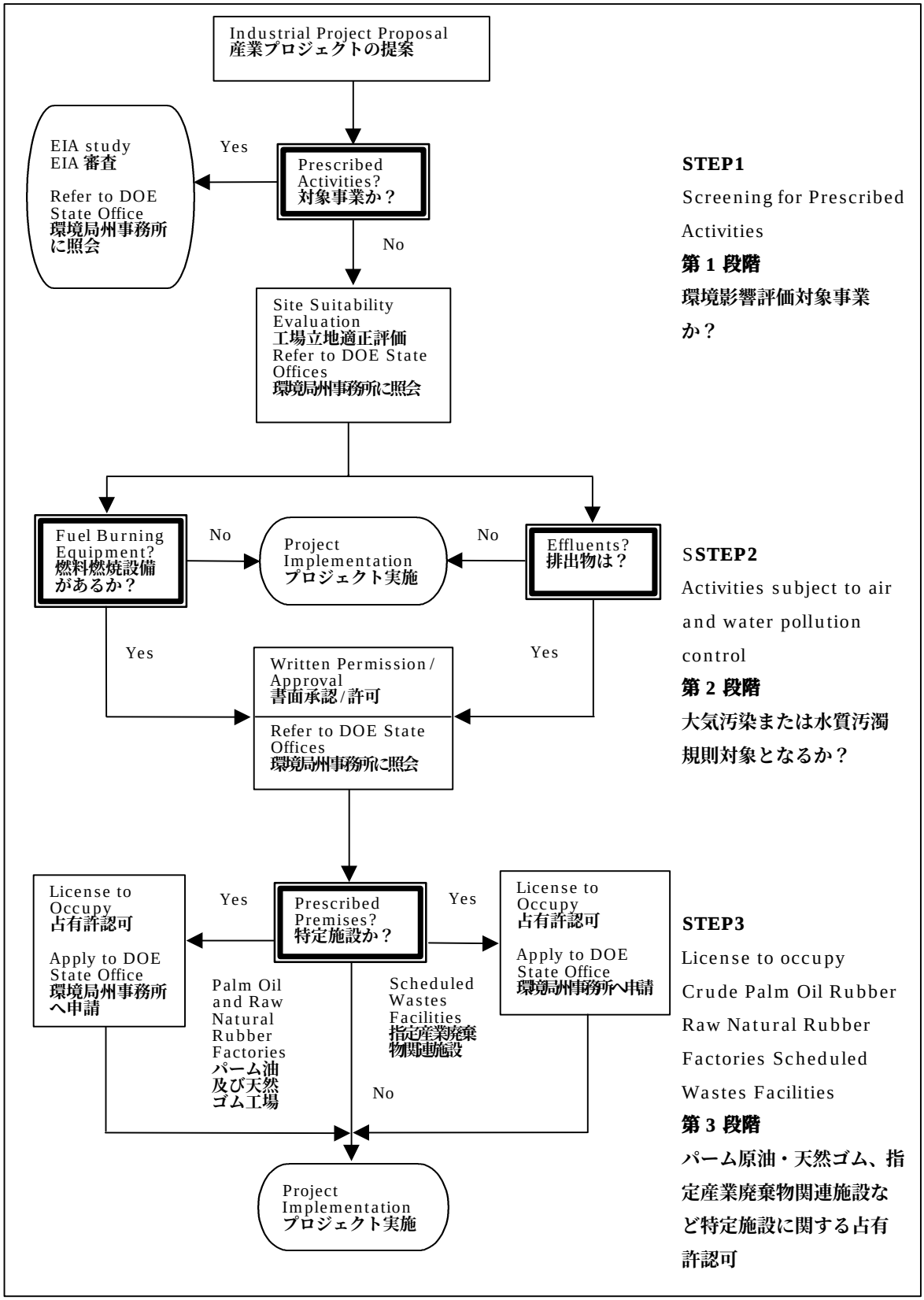
While Japanese companies are expected to properly comply with wastewater controls and all other environmental controls in Malaysia, anyone who proposes to build a new plant or to expand existing facilities must go through a variety of environment-related formalities at each stage of project planning and construction. These formalities include conducting environmental impact assessment, presenting written permission or approval, and obtaining licenses.

For a new project, such as plant construction, for example, environmental impact assessment is required at the planning stage if the project is a prescribed activity. Even if the project is a non-prescribed activity, Site Suitability Evaluation is required. At the construction stage, the provisions of the above-mentioned regulations about wastewater, air pollution, and scheduled wastes state that prior written approval and written permissions must be obtained from the Director General of the DOE if, for example, the company is building a plant that will discharge industrial wastewater, or if the plant has combustion or power generation facilities exceeding a certain size. If the proposed facility is a palm oil mill, rubber mill, or scheduled waste-related facility, a separate license to use and occupy the site is required. In addition, once a plant is operational, the company must submit regular monitoring reports on wastewater and reports on scheduled wastes generated in the plant.

Written permission must be obtained from the Director General of the DOE if a new source of pollutant discharge will result from adding factory facilities or changing a manufacturing process, or if the company is installing an incinerator or a combustion facility exceeding a certain size. Prior consultation with the DOE is also required to install facilities for preventing air or water pollution.

The DOE has published an English pamphlet, "Environmental Requirement: A Guide for Investors," which is a useful reference about environmental legislation and procedures. It is written for foreign companies and explains many environmental requirements for building a factory in Malaysia. The following flowchart is taken from the guide. It summarizes the prior procedural requirements for a new project.

Figure 1-3-3 Application Procedure for Environmental Requirements



Source： DOE/MOSTE, *Environmental Requirements: A Guide for Investors*, 1996

Section 4
Water Pollution Management

1. Malaysia's Water Pollution Regulations

Tin mining, palm oil production, and natural rubber production were once the main industries in Malaysia, and because the country's first pollution problem was water pollution caused by these three traditional industries, water pollution is given high priority in Malaysia's environmental regimes. According to 1997 estimates from the Department of Environment (DOE), domestic wastewater contributed approximately 70 percent of organic water pollution as measured by biochemical oxygen demand (BOD) load, followed by pig rearing which contributed 27 percent. Thus, the pollution load due to the manufacturing sector and agriculture-based traditional industries such as palm oil production is minor these days. However, water pollution resulting from rapid industrialization is a growing concern in the community, and wastewater controls focused on industrial wastewater are the most effective in practical terms of all Malaysia's environmental regulations.

In Malaysia, water pollution standards comparable to Japan's environmental standards have been set for river water quality. Water quality is categorized into six classes, from a level where the natural environment is conserved in which aquatic organisms that are particularly sensitive to environmental changes can live, to a level that can be used as drinking water after advanced treatment, through to a level useable for agricultural irrigation. Water quality standards are defined for approximately 70 parameters, including ammonia nitrogen, BOD, and coliform group number, together with a large number of heavy metals and pesticide components. There are no specific environmental standards for lakes and ponds. Interim standards to be applied to coastal waters are currently proposed.

The regulations that directly affect the industrial activities of Japanese companies are the wastewater standards provided for in the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979. These standards concern not only industrial wastewater; the same limit values apply to domestic wastewater as well.

Wastewater standards are prescribed as a set of nationally uniform standards divided into two categories: Standard A applies to areas upstream from drinking water intake points, and Standard B applies to areas downstream from drinking water intake points. Each standard covers 23 parameters, including general parameters such as temperature, pH, and suspended solids (SS), as well as BOD, chemical oxygen demand (COD), and various types of heavy metals. Standard B has more lenient limits than Standard A, but for most parameters even in Standard B, the limits are more stringent than Japan's wastewater standards. In addition, although it does not prescribe specific wastewater standards, the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979 prohibit discharge into inland waters such as rivers of the following substances: (1) inflammable solvents, (2) tar and other liquids immiscible with water, (3) refuse, garbage, sawdust, timber, and human or animal waste, etc.

In the interests of protecting the two traditional industries of palm oil and natural rubber production, and in view of the fact that strict wastewater standards are difficult to achieve in a short term due to the nature of their production processes, the government has set separate and more lenient wastewater standards for these two industries than for other manufacturing industries. There are also special regulations and orders under the Environmental Quality Act (EQA) 1974 that apply only to these two industries.

Figure 1-4-1 Proposed Interim National Water Quality Standard

Class I	Conservation of natural environment water supply I- practically no treatment necessary. Fishery Ⅰ- very sensitive aquatic species
Class IIA	Water SupplyⅡ-conventional treatment required. Fishery II- sensitive aquatic species
Class IIB	Recreational use with body contact
Class III	Water Supply Ⅲ- extensive treatment required. Fishery Ⅲ- common, of economic value, and tolerant species livestock drinking
Class IV	Irrigation
Class V	None of the above

(units are mg/liter unless otherwise specified)

PARAMETERS/項目	CLASSES/級ごとの基準値					
	I	II A	II B	III#	IV	V
Ammoniacal Nitrogen / アンモニア性窒素	0.1	0.3	0.3	0.9	2.7	2.7
BOD/生物化学的酸素要求量	1	3	3	6	12	12
COD/化学的酸素要求量	10	25	25	50	100	100
DO:Dissolved Oxyzen/溶存酸素	7	5-7	5-7	3-5	3	1
PH	6.5-8.5	6.5-9.0	6.5-9.0	5-9	5-9	-
Colour/色度(TUC)	15	150	150	-	-	-
Elec. Conductively/電気伝導率 (μmhos/cm)**	1000	1000	-	-	6000	-
Floatables/浮遊物	NV	NV	NV	-	-	-
Odour/臭気	NOO	NOO	NOO	-	-	-
Salinity/塩分(%)**	0.5	1	-	-	2	-
Taste/味	NOT	NOT	NOT	-	-	-
Total Dissolved Solid /全溶解固形物	500	1000	-	-	4000	-
Total Suspended Solid/ 全浮遊物質	25	50	50	150	300	300
Temperature/温度(℃)	-	Normal 2	-	Normal 2	-	-
Turbidity/濁度(NTU)	5	50	50	150	300	300
Fecal Coliform/糞便性大腸菌 (MPN/100ml)	10	100	400	5000 (20000)@	5000 (2000)@	-
Total Coliform/全大腸菌 (MPN/100ml)	100	5000	5000	5000	5000	5000
Al/アルミニウム	-	-	-	0.056	0.5	-
As/ヒ素	N	0.05	NR	0.045 (0.44)	0.1	+
Ba/バリウム	N	1	NR	-	-	+
Cd/カドミウム	N	0.005	NR	0.001 (0.001**)	0.01	+
Cr (VI)/6価クロム	N	0.05	NR	0.054 (1.45)	0.1	+
Cr (Ⅲ)/3価クロム	N	-	NR	- (2.53)	-	+
Cu/銅	N	1	NR	0.01 (0.012*)	0.2	+
Hardness/硬度	N	100	NR	-	-	+
Fe/鉄	N	0.3	NR	1	1(Leaf) 5(Others)	+

Pb/**鉛**	N	0.05	NR	0.01 (0.014*)	5 -	+
Mn/**マンガン**	N	0.1	NR	0.1	0.2	+
Hg/**水銀**	N	0.001	NR	0.0001 (0.004)	0.002	+
Ni/**ニッケル**	N	0.05	NR	- (0.9*)	0.2	+
Se/**セレン**	N	0.01	NR	0.037 (0.25)	0.02	+
Ag/**銀**	N	0.05	NR	- (0.0002)	-	+
Sn/**スズ**	N	NR	NR	0.05	-	+
U/**ウラン**	N	NR	NR	-	-	+
Zn/**亜鉛**	N	5	NR	- (0.35)	2	+
B/**ホウ素**	N	1	NR	3.4	0.75	+
Cl^-/**塩素イオン**	N	200	NR	-	79	+
Cl_2/**遊離塩素**	N	-	NR	0.022	-	+
CN/**シアン**	N	0.02	NR	0.0023 (0.058)	-	+
F/**フッ素**	N	1	NR	- (11)	1	+
NO_3/**硝酸性窒素** NO_2/**亜硝酸性窒素**	N	7/3	NR	0.028 (0.37)	5	+
P/**リン**	N	0.1	NR	0.1	-	+

Notes
NV No Visible floatable materials or debris
NOO No Objectionable odour
NOT No Objectionable taste
** Related Parameters, only one recommended for use
@ Maximum not to be exceed
NR No Recommendation
* At hardness 50 mg/liter$CaCO_3$
# 24 r average and maximum (bracketed) concentrations are shown
N Natural levels
+ Levels above Class **IV**
Source： DOE/MOSTE, *MALAYSIA EMVIRONMENTAL QUALITY REPORT 1997*, 1997

2. Water Quality Control of Industrial Wastewater

(1) Malaysia's Industrial Wastewater Standards Stricter than in Japan

As discussed above, in 1979 the Malaysian government prescribed wastewater standards, which are listed in Table 1-4-2. Corresponding Japanese national wastewater standards set by the Ordinance of Prime Minister's Office are listed for comparison. Malaysia's standards are classified into two sets of standards, A and B, according to the river area into which wastewater is discharged. Standard A applies to wastewater discharge upstream from a drinking water intake point, while Standard B applies to discharge downstream from an intake point. Naturally, Standard A is stricter than Standard B. These standards are largely influenced by British and U.S. standards.

Even in the comparatively lenient Standard B, most parameters are in fact stricter than the corresponding Japanese standards. Standard A also has some parameters with limits that are not easy to meet. For example, the limit of 50 mg/liter for COD_{Cr} is extremely tight. Not only is it stricter than the Japanese standard of 160 mg/liter, but the method of measurement differs between the two countries. Japan uses potassium permanganate as the oxidizing agent for measuring the amount of oxygen required for the oxidizing reaction (COD_{Cr}), whereas Malaysia uses potassium dichromate for the oxidizing reaction (COD_{Mn}). As potassium dichromate is a more powerful oxidizing agent than potassium permanganate, it yields a higher result when the same sample is analyzed by both methods. Although the results depend on the sample, the potassium dichromate test gives values that are roughly three times higher than given by the potassium permanganate test. Therefore, the Japanese standard of 160 mg/liter works out to around 500 mg/liter by the Malaysian method of measurement, a figure that is 10 times greater than the Malaysian standard of 50 mg/liter. Clearly, wastewater treatment equipment that meets Japan's wastewater standards will not be adequate when used in Malaysia.

Another point to consider is that although most Japanese companies in Malaysia site their factories in industrial estates, those industrial estates, unlike other Southeast Asian countries, do not have central wastewater treatment facilities. All companies must treat their wastewater themselves.

Malaysia's wastewater standards also apply to domestic wastewater. Japanese companies typically have factories that employ several hundreds of people, and generate large volumes of wastewater from toilets and kitchen facilities. Before this wastewater can be discharged, it must be treated to meet the COD_{Cr} standard of 50 mg/liter, which translates to 15 mg/liter by the Japanese method of measurement. To meet this standard, it is essential to have advanced wastewater treatment facilities such as those which combine activated sludge treatment with activated carbon treatment, and to manage operation of the facility very attentively. In fact, in this survey we came upon one Japanese company that was going through troubles to treat its domestic wastewater because it was located in an industrial estate without any sewerage facilities to treat domestic wastewater.

Among heavy metal standards, Malaysia has a strict Standard A limit of 0.2 mg/liter for nickel (Ni), a heavy metal that is not regulated in Japan's standards. Heavy metals are generally removed from wastewater by settling separation, by adding alkalis to form hydroxides that are insoluble in water. However, because nickel hydroxide has the characteristic of adsorbing water-soluble nickel salts, these salts will start to dissolve gradually even when the hydroxide is settled. This makes it difficult to treat nickel to a concentration within the standard.

Tin (Sn) is another parameter not covered in Japan's standards. Tin is one of the principal products of Malaysia, which has tin mines and refineries. Tin is covered in the wastewater standards because of past incidents of mine pollution.

The zinc (Zn) standard of 1.0 mg/liter is stricter than Japan's 5 mg/liter. Zinc is an amphoteric metal, and dissolves into both acidic liquids and strong alkaline liquids. Consequently, to treat the water-insoluble hydroxides to the prescribed concentration, the pH must be kept to within an extremely narrow range during operation of the wastewater treatment facility.

The cyanide (CN) level of 0.05 mg/liter for Standard A is one twentieth the value of Japan's standard of 1.0 mg/liter. Cyanide is decomposed by an oxidizing reaction while controlling the pH and oxidation-reduction potential, but a mistake can result in the release of poisonous cyanide gas and discharge of wastewater that exceeds the standard value. Therefore, a trained person must be in charge of running the facility full-time.

Malaysia currently has no specific standards for groundwater and soil contamination, including those for organochlorine compounds such as trichloroethylene. However, the EQA 1974 does have provisions prohibiting discharge of any waste into the environment, so proper care must also be taken in regard to these groundwater and soil contaminants.

Figure 1-4-2 Comparison of Malaysia's and Japan's Effluent Standards

(mg/liter)

Parameter \ Country	National Standard		
	Malaysia[1]		Japan[2]
	A[3]	B	
Temperature/温度 (℃)	40	40	-
pH	6.0-9.0	5.5-9.9	5.8 - 8.6
BOD/生物化学的酸素要求量	20	50	160
COD_{Cr}/化学的酸素要求量	50	100	160 (COD_{Mn})
SS/浮遊物質	50	100	200
Fat, oil & grease/油脂分	ND	10.0	5[4] 30[5]
Cu/銅 [6]	0.20	1.0	3.0
Mn/溶解性マンガン [6]	0.20	1.0	10
Ni/ニッケル [6]	0.20	1.0	-
Sn/スズ [6]	0.20	1.0	-
Zn/亜鉛	1.0	1.0	5
Fe/溶解性鉄	1.0	5.0	10
Cr^{3+}/3 価クロム [6]	0.20	1.0	-
Cr/クロム	-	-	2
F/フッ素	-	-	15
T-coli. bacteria/全大腸菌 (MPN/100 ml)	-	-	3000
T-N/窒素	-	-	120
P/リン	-	-	16
B/ホウ素	1.0	4.0	-
Phenol/ﾌｪﾉｰﾙ [7]	0.001	1.0	5.0
Free Cl/遊離塩素 [7]	1.0	2.0	-
S^{2-}/硫化物イオン	0.5	0.5	-
Cd/ｶﾄﾞﾐｳﾑおよびその化合物	0.01	0.02	0.1
T-CN/シアン化合物	0.05	0.1	1.0
Pb/鉛およびその化合物	0.1	0.5	0.1
Cr^{6+}/6 価クロム化合物	0.05	0.05	0.5

As/**ひ素およびその化合物**	0.05	0.1	0.1
T-Hg/**水銀およびその化合物**	0.005	0.05	0.005
Alkyl-Hg/**アルキル水銀**	-	-	N. D.
Org. P/**有機リン**	-	-	1.0
PCB/**ポリ塩化ビフェニル**	-	-	0.003
Trichloroethylene/**ﾄﾘｸﾛﾛｴﾁﾚﾝ**	-	-	0.3
Tetrachloroethylene/**ﾃﾄﾗｸﾛﾛｴﾁﾚﾝ**	-	-	0.1
Dichloromethane/**ｼﾞｸﾛﾛﾒﾀﾝ**	-	-	0.2
Carbon tetrachloride/ **四塩化炭素**	-	-	0.02
1,2-Dichloroethane/ 1,2-**ｼﾞｸﾛﾛｴﾀﾝ**	-	-	0.04
1,1-Dichloroethylene/ 1,1-**ｼﾞｸﾛﾛｴﾁﾚﾝ**	-	-	0.2
sis-1,2- Dichloroethylene / **ｼｽ**-1,2-**ｼﾞｸﾛﾛｴﾁﾚﾝ**	-	-	0.4
1,1,1- Trichloroethane/ 1,1,1-**ﾄﾘｸﾛﾛｴﾀﾝ**	-	-	3
1,1,2- Trichloroethane / 1,1,2-**ﾄﾘｸﾛﾛｴﾀﾝ**	-	-	0.06
1,3- Dichloropropene/ 1,3-**ｼﾞｸﾛﾛﾌﾟﾛﾍﾟﾝ**	-	-	0.02
Tiurum/**チウラム**	-	-	0.06
Simazine/**シマジン**	-	-	0.03
Thiobencable/**チオベンカブル**	-	-	0.2
Benzene/**ベンゼン**	-	-	0.1
Se/**セレンおよびその化合物**	-	-	0.1

1) Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979
2) Wastewater standards prescribed by the Ordinance of Prime Minister's Office (Annex 1 of Regulation No.54, 1993 and Annex 2 of Regulation No.40, 1993)
3) Upstream from drinking water intake point
4) Normal-hexane extracts, and mineral oils
5) Normal-hexane extracts, and animal and vegetable oils
6) For wastewater, containing two or more of trivalent chromium (Cr^{3+}), copper (Cu), soluble manganese (Mn), nickel (Ni), or tin (Sn), the combined concentration must not exceed 0.5 mg/liter for a Standard A area or 3.0 mg/liter for a Standard B area, and soluble metals must not exceed 1.0 mg/liter.
7) If both phenol and free chlorine are present in the discharge to a Standard B area, the phenol must not exceed 0.2 mg/liter concentration, and the free chlorine must not exceed 1 mg/liter.

(2) More Stringent Standards Prescribed by DOE State Offices

In Malaysia, the wastewater standards prescribed by the national government are uniformly applied nationwide, and neither the state governments nor DOE State Offices set their own standards or determine more stringent limit values. In exceptional cases, however, a DOE State Office may give administrative guidance and impose specific standards more stringent than national ones.

An example found in our survey is a Japanese company in Negeri Sembilan which was verbally directed to comply with a standard of 15 mg/liter for fluoride (F), a chemical not covered in the national wastewater standards. In another case, the DOE State Office in Selangor once set a standard of 5 mg/liter for ammonia nitrogen when low rainfall significantly increased contamination of the river water. This regulation applied mainly to household wastewater, and Japanese companies were required to use aeration and other measures.

Malaysia is currently reviewing its wastewater standards aiming at mid-2000 implementation. It is possible that ammonia nitrogen, the standard on which is currently applied only to the natural rubber industry, will be added to the national wastewater standards.

(3) Methods of Wastewater Analysis

The methods for analyzing water quality comply with the "Standard Methods for the Examination of Water and Wastewater," jointly published by the American Public Heath Association (APHA), American Water Works Association (AWWA), and the Water Environment Federation (WEF). Chemical oxygen demand (COD) levels are detected as COD_{Cr} by the potassium dichromate test. Either the open reflux method or closed reactor method is acceptable as the method of COD measurement. As discussed previously, COD_{Cr} gives a higher reading than the potassium permanganate test (COD_{Mn}) used in Japan. Therefore, an wastewater treatment method that satisfies the Japanese COD standard will not necessarily meet the tougher Malaysian wastewater standard when applied in Malaysia. A more advanced treatment facility may be required in some cases.

(4) Enforcement of Wastewater Regulations

According to the DOE, officers of the department carried out on-site inspection at a total of 5,290 factories nationwide in 1997. Of these, 4,402 factories (83 percent) were found to have complied with the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979. The highest rates of non-compliance were found among the metal finishing, electroplating, food and beverage, paper-making, and oil refining industries, but most of the offending industries appear to be locally financed small to medium-sized factories.

Malaysia generally impose administrative fines for minor offenses against environmental regulations. However, Japanese companies should be aware that stern action is taken for failure to comply with wastewater regulations, and offenders are immediately prosecuted and put on trial.

The EQA 1974 provides for a system of contravention licenses, whereby a company can be exempted from wastewater or air pollution regulations for a set period. The company must have a valid reason, such as being engaged in construction of pollution control facilities or carrying out work to improve performance. In 1997, the DOE received 78 applications for contravention licenses, nearly double the number of applications in the previous year.

Section 5
Air Pollution Management

1. Malaysia's Air Pollution Regulations

The principal cause of air pollution in Malaysia at present is mobile emission sources, particularly motor vehicle emissions which are the main focus of government initiatives to control air pollution. Based on the Environmental Quality Act (EQA) 1974, motor vehicle emissions are regulated by the Environmental Quality (Control of Emission from Petrol Engines) Regulations 1996, Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996, and Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985. In addition, the Environmental Quality (Motor Vehicle Noise) Regulations were issued in 1987.

A committed regulatory program on motor vehicle emissions is being enforced through these regulations. Since 1997 the government has enacted regulations specifically about emissions from new vehicles and has launched a surveillance and monitoring campaign, called the "Area Watch and Sanction Inspection" (AWASI), targeting black smoke emissions from diesel vehicles. Vehicles are subject to roadside inspection, and owners may be ordered to repair their vehicles.

Further, in response to the large-scale haze incident in 1997, a nationwide prohibition on open burning was incorporated into the EQA in 1998, and aerial surveillance is being conducted.

The standards for air pollution in Malaysia are a set of environmental standards that indicate desirable quality levels for the ambient air. These standards are similar to Japan's air quality standards. They stipulate environmental standards, and target years for compliance, for a total of eight substances: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), total suspended particulate (TSP), particulate matter less than 10 microns (PM10), lead (Pb), and dustfall which was added later.

In regards to air pollution from industrial activities, the government has issued regulations on emission of air pollutants from stationary sources under the provisions of the Environmental Quality (Clean Air) Regulations 1978.

Figure 1-5-1 Recommended Air Quality Guidelines (Ambient Standards)

(at 25℃ and 101.13kPa)

Pollutant and Method	Averaging Time	Malaysia Guidelines		Target Year for Compliance
		(ppm)	($\mu g/m^3$)	
Ozone AS 2524	1 Hour 8 Hour	0.10 0.06	200 120	1995
Carbon Monoxide AS2695	1 Hour 8 Hour	30 9	35 10	1995 1995
Nitrogen Dioxide AS2447	1 Hour	0.17	320	1990
Sulfur Dioxide AS2523	10 Minute 1 Hour 24 Hour	0.19 0.13 0.04	500 350 105	1990
Particles TSP AS2724.3	24 Hour 1 Year		260 90	1995
PM10 AS2724.6	24 Hour 1 Year		150 50	1995
Lead AS2800	3 month		1.5	1991
Dustfall	1 Year	133 ($mg/m^2/day$)		1995

Source： DOE/MOSTE, *Environmental Requirements: A Guide For Investors* , 1996

2. Industrial Emission Standards

(1) Emission Standards for Stationary Sources

The emission standards for stationary sources based on the Environmental Quality (Clean Air) Regulations 1978 stipulate a standard value for each emission source for four categories of pollutants: black smoke, dust or solid particles, metals or metallic compounds, and gaseous substances. The category of metals or metallic compounds includes seven substances, such as mercury, cadmium, and zinc. The gaseous substances category includes nine substances, such as acid gas, chlorine gas, hydrogen sulfide, and nitrogen oxides. For the seven types of metals or metallic compounds, the regulations apply to all industries. For chlorine gas, hydrogen chloride, and hydrogen sulfide, the regulations apply to all emission sources.

When these emission standards came into effect in 1978, they were enforced as phased regulations over three stages (A, B and C). Existing facilities were required to satisfy the most lenient regulations, Standard A, no more than two years after enactment, and to achieve Standard B no more than three years after enactment. New facilities have to meet the most stringent regulations, Standard C, from the outset. As virtually all Japanese companies presently operating in Malaysia probably started factory operations after the standards came into effect, only the requirements under Standard C are presented in Table 1-5-2. Note that, as well as these standards, separate emission standards apply to cement and stone crushing industries located in prescribed areas.

Factories are required not only to comply with these standards but to carry out quarterly monitoring and to notify the results to the DOE. The DOE is currently intensifying its program of on-site inspection of factories, but on-site inspection for emission is less effective than that for wastewater, because, for example, the DOE State Office in Selangor is only allowed to take samples of total suspended particulate (TSP), and for the other parameters it must simply trust the readings taken by the company itself.

Most Japanese companies in Malaysia are assembly industries centering in the electrical and electronics sector. The contribution of these companies to the air pollution load is mostly fumes from factory vent ducts. Consequently, although they have measures in place, these companies do not appear to give high priority to emission controls.

(2) Other Air Pollution Regulations

In addition to the above-mentioned emission standards for factories and stationary emission sources, the Environmental Quality (Clean Air) Regulations 1978 require companies to adopt a "best practicable means" policy in regard to manufacturing processes, operation methods, raw material selection, pollutant removal facilities, and so on, in order to render harmless a wide variety of toxic or irritating air pollutants. The requirements apply to approximately 40 substances, including hydrochloric acid, fluoride, and bromide. Offensive odor substances such as hydrogen sulfide and ammonia are also included.

No specific numerical standards are given in regard to adopting best practicable means. If the Director General of the DOE determines that discharge of a particular substance is deleterious to health, the owner of the factory or facility must take steps to reduce the emission of that substance by adopting the best practicable means.

Other provisions in the Environmental Quality (Clean Air) Regulations 1978 set forth a variety of formalities required when establishing or replacing various types of facilities. For example, prior written approval from the Director General of the DOE is required to install, in the vicinity of a residential area, heating or power generating equipment that uses liquid or gaseous fuel at the rate of 10 kg or more per hour, or to install, relocate or replace a facility that consumes gaseous fuel at the rate of 15 kg or more per hour.

The Clean Air Regulations also grant authority to the Director General of the DOE to order a company to cease operations for a set duration if its pollution control equipment breaks down or if any health damage is caused by the factory.

Figure 1-5-2 Air Emission Standards (Standard C)

Substance Emitted	Sources of Emission	Standards
Dark Smoke*	(1) Solid Fuel Equipment or Facilities (2) Equipment using other types of fuel	No.1 on the Ringelmann Chart No.2 on the Ringelmann Chart
Dust	(1) Facilities used for the heating of metal other than Cold Blast Foundry Cupola (2) Asphalt concrete/ Bituminous mixing plant (3) Portland cement plant •Kiln •Clinkler cooler, finfish grider, others and other (4) Industry or process which emits or discharges dust or any solid particles containing asbestos or free silica (5) Other source	0.2 g/Nm^3 0.3 g/Nm^3 (Stationary Plant) 0.4 g/Nm^3 (Mobile Plant) 0.2 g/Nm^3 0.1 g/Nm^3 0.12 g/Nm^3 0.4 g/Nm^3
Metals and metallic compounds**		
1. Mercury / Hg	Industry	0.01 g/Nm^3
2.Cadmium/ Cd	Industry	0.015 g/Nm^3
3. Lead / Pb	Industry	0.025 g/Nm^3
4. Antimony / Sb	Industry	0.025 g/Nm^3
5.Arsenic / As	Industry	0.025 g/Nm^3
6. Zinc / Zn	Industry	0.1 g/Nm^3
7. Copper / Cu	industry	0.1 g/Nm^3
Gases		
1. Acid Gases	Manufacture of sulphuric acid	3.5 g/Nm^{3}of sulphur trioxide and no persistent mist
2. Sulphuric acid mist or sulphur trioxide or both	Any source other than combustion process and plant for manufacture of sulphuric acid in (a) above	0.2 g/Nm^3 of sulphur trioxide
3. Chlorine gas	Any source	0.2 g/Nm^3 of chlorine
4. Hydrogen chloride	Any source	0.4 g/Nm^3 of hydrogen chloride
5. Fluorine, hydrofluoric acid, or inorganic fluorine compound	Manufacture of aluminium from alumina	0.02 g/Nm^3 of hydrofluoric acid
6. Fluorine, hydrofluoric acid, or inorganic fluorine compound	Any source other than manufacture of aluminium from alumina as in (e) above	0.1 g/Nm^3 of hydrofluoric acid
7. Hydrogen sulphide	Any source	5 parts per million for volume
8. Oxide of nitrogen	Manufacture of nitric acid	1.7 g/Nm^3 and substantial colorless
9. Oxides of nitrogen	Any source other than Combustion processes and Manufacture of nitric acid as in 8 above	2.0 g/Nm^3

* Allowable to exceed both standards not longer that 5 minutes in any period of one hour and 15 minutes in any period of 24 hours.

** Whenever the emission consists of two or more of the above substances, the total mass of the first five shall not exceed 0.04 g /Nm^3 or the sum of individual allowable limits, whichever is less, and in addition, the individual limit shall not exceed.

Source： International Law Book Services, *Environmental Quality Act 1974 (Act 127) & Subsidiary Legislations* (as at 25th August 1998), 1998

Section 6
Industrial Waste Management

1. Implications of Malaysia's Industrial Waste Problems

As mentioned in Section 1, the greatest environmental challenge facing Malaysia is the problem of burgeoning industrial wastes brought about by the fast pace of industrial expansion. The main problem surrounds scheduled wastes, which are subject to strict laws and regulations. According to legislation such as the Environmental Quality (Scheduled Wastes) Regulations 1989, solid wastes defined in the legislation as scheduled wastes can only be finally disposed of at disposal facilities prescribed by the Director General of the Department of Environment (DOE). However, until 1997, or for around a decade after the regulations came into force, no prescribed final disposal facilities existed in Malaysia. Throughout this time, Japanese manufacturers were forced to store scheduled wastes on-site, and the majority of Japanese companies were faced with ever-growing stacks of solid wastes.

The final disposal plant run by Kualiti Alam (KA), a private company with some Danish financing, became partially operational at the end of 1997 and started full operation in June 1998. However, treatment and disposal charges are higher than in Japan, and environmental costs of Japanese companies are much affected by scheduled wastes treatment and disposal. Nevertheless, since this is the only prescribed disposal facility approved under the law, Japanese companies endeavoring to treat their wastes in accordance with the regulations will, for the time being, have to bear these high waste treatment costs.

Malaysia has a robust semiconductor industry in which a large contingent of Japanese companies participate. At present, all these companies are carrying out only the so-called downstream process in semiconductor manufacturing – the assembly process after silicon wafers are sliced. This is because they would not be able to cope with final disposal of the increased volume of scheduled wastes if integrated manufacturing including the upstream process was carried out in Malaysia. This is a typical example of how the problem of scheduled wastes has become a constraint on industrial development.

2. Scheduled Waste Laws and Regulations

Legislation regarding scheduled wastes in Malaysia is basically set forth in three regulations and orders: Environmental Quality (Scheduled Wastes) Regulations 1989, Environmental Quality (Scheduled Wastes Treatment and Disposal Facilities) Order 1989, and Environmental Quality (Scheduled Wastes Treatment and Disposal Facilities) Regulations 1989.

The term "scheduled wastes," as used in Malaysia, refers to categories of solid wastes ranging from hazardous wastes to toxic substances. Almost all the substances considered to be industrial wastes in Japan would fit within Malaysia's scheduled wastes categories. There are currently 107 categories of industrial wastes listed as scheduled wastes under the environmental regulations, including 28 types defined by their structure and composition rather than by their source, and 30 types that can be identified by source, such as sludge generated by wastewater treatment (see Appendix 2). The regulations on scheduled wastes do not prescribe any permissible limits in terms of discharge volume or concentration of contaminants. This means that even if a factory generates only a very slight amount of scheduled wastes, final disposal in accordance with the laws and regulations is still required.

The regulations stipulate that scheduled wastes can only be finally disposed of at "prescribed premises" approved by the Director General of the DOE, and the waste generator is required to store the waste if no prescribed premise exists. At the moment, since Malaysia's only prescribed premise is the final disposal facility operated by Kualiti Alam, all scheduled wastes must be transported to Negeri Sembilan where the facility is located.

Other provisions under the regulations state that if scheduled waste is newly generated, the waste generator is obliged to notify the Director General of the DOE within one month. Further, if a new type of scheduled waste is generated, or is likely to be generated, as a result of alteration to a manufacturing process, for example, the waste generator must promptly notify the category and quantity of the waste generated. In addition, the provisions state that the waste generator is obligated to endeavor to reduce the amount of scheduled wastes generated by using the most practical method, and is responsible for

storage and transportation to prescribed premises.

To transport scheduled waste to the prescribed premises (Kualiti Alam's final disposal facility), the regulations require the waste generator to fill out a prescribed consignment note in six copies, stating the characteristics of the waste and handling precautions, and to hand it to a DOE-approved contractor. The waste generator, contractor, final disposal facility, and DOE each receive a copy of the consignment note, and one copy comes back to the waste generator as proof that final disposal was carried out.

The waste haulage contractors carry out resource recycling and other related operations in addition to transporting scheduled wastes. There are currently about 60 such contractors in Malaysia. An up-to-date list can be obtained from the DOE.

Malaysia has taken an increasingly strict stance on the export of scheduled wastes even for resource recovery, which once considered as an appropriate purpose by the DOE, since it ratified the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes in 1993. The basic pre-requisites for scheduled wastes export are that the purpose is resource recovery and there is no appropriate method of recycling in Malaysia, and that the exporter has the approval of the appropriate government authorities in the destination country.

As of 1997, there were approximately 3,100 factories generating scheduled wastes in Malaysia, an increase of about 750 from the previous year.

3. Kualiti Alam: Only Waste Disposal Facility

In the course of this survey, we had the opportunity to visit Kualiti Alam, the only final disposal facility for scheduled wastes in Malaysia, and to gain an overview of the facility and see how wastes are processed. As Kualiti Alam is generally believed to charge high fees for treatment and disposal, we compared the company's charges with corresponding waste treatment charges in Japan.

(1) Company Profile

Kualiti Alam was established in 1991 with joint funding from two Malaysian engineering and construction-related companies and a Danish waste treatment company. Kualiti Alam is the only company carrying out integrated treatment of scheduled wastes in Malaysia. In 1995 the government awarded the company a 15-year exclusive right to conduct the scheduled wastes final disposal operation in Malaysia.

Kualiti Alam carries out incineration of scheduled wastes, physical and chemical treatment, stabilizing solidification, and final disposal by landfill. The facility was fully completed in June 1998. Its treatment capacity is as follows (as of November 1999):

- Incinerator: 30,000 tons per annum (24-hour continuous operation)
- Physical and chemical treatment: 5,000 tons per annum (operating 8 hours/day)
- Solidification: 20,000 tons per annum (operating 8 hours/day)
- Landfill disposal: 156,000 tons per annum (600 tons/day x 260 days of operation per year)
- Total treatment capacity: 211,000 tons per annum
- Plant construction costs: approx. 10 billion yen
- Number of employees: 157

The basic plan for the facility was drawn up by Danish consultants, and a Japanese construction company was the principal contractor. The incinerator is from a Japanese company, while Swedish technology is used for treatment of gaseous emissions, and Danish technology is used for physical/chemical treatment and solidification. All the equipment is of the highest standard internationally.

The total volume of waste treated at the facility during the period of January to October 1999 was 56,000 tons. On an annualized basis, this figure equates to an estimated 67,000 tons for 1999. The company

has liaison offices in every state and customers throughout the country. As of August 1999, scheduled wastes are being collected from 773 establishments.

(2) Equipment Overview, Treatment Processes, and Pollution Control System

Figure 1-6-1 outlines the treatment equipment. The actual treatment processes for each type of scheduled waste coming into the facility, and the pollution control system are discussed below.

Cyanide-containing wastewater goes through an oxidative decomposition process, and hexavalent-chromium-containing wastewater undergoes reduction. The treated wastewater from both these processes is then neutralized together with acid and/or alkali wastewater and subjected to coagulating sedimentation to separate out the heavy metals. The deposited sludge is turned into dewatered sludge by a belt filter, and then transferred to a kneading machine and solidified by mixing with cement. The resultant solid waste is then disposed of by landfill.

Solid organic waste, organic wastewater, high viscosity waste, and toxic waste are incinerated in a rotary kiln incinerator at around 1,200°C. Solid waste that has the total organic carbon (TOC) of more than 10 percent, as measured by prior analysis, is categorized to be organic waste and is incinerated. Solid waste with the TOC of less than 10 percent, and with heavy metal leaching not exceeding the standard value, is disposed of by landfill without further treatment. High viscosity waste refers to waste oil and so on, and the heat generated from incinerating this waste is used to incinerate sludge and other solid waste and organic wastewater of low heat values. The supernatant of the sedimentation tank used in the wastewater treatment process described above is used in part for kneading the solidified waste with cement, and the rest is injected into the incinerator's vertical secondary combustion chamber and evaporated. To maintain sufficient combustion temperature to evaporate the wastewater, fuel oil is added to supplement the combustion in the rotary kiln and the incinerator's secondary combustion chamber.

The solidified and stabilized waste is dumped in a landfill facility next to the treatment facility. The landfill facility has two landfill sites and a total area of 182,100 square meters. Filling begins from 1 meter above groundwater level, and waste is piled to a height of 61 meters above sea level. Total volume when full is 2.5 million tons. At present, one site has reached 46 meters above sea level, but the other has not reached that level yet. When a site is full, it is covered with polyethylene sheets and then covered with soil. There are plans to build two more such sites, with an expected life span of 20 years before all four sites are full.

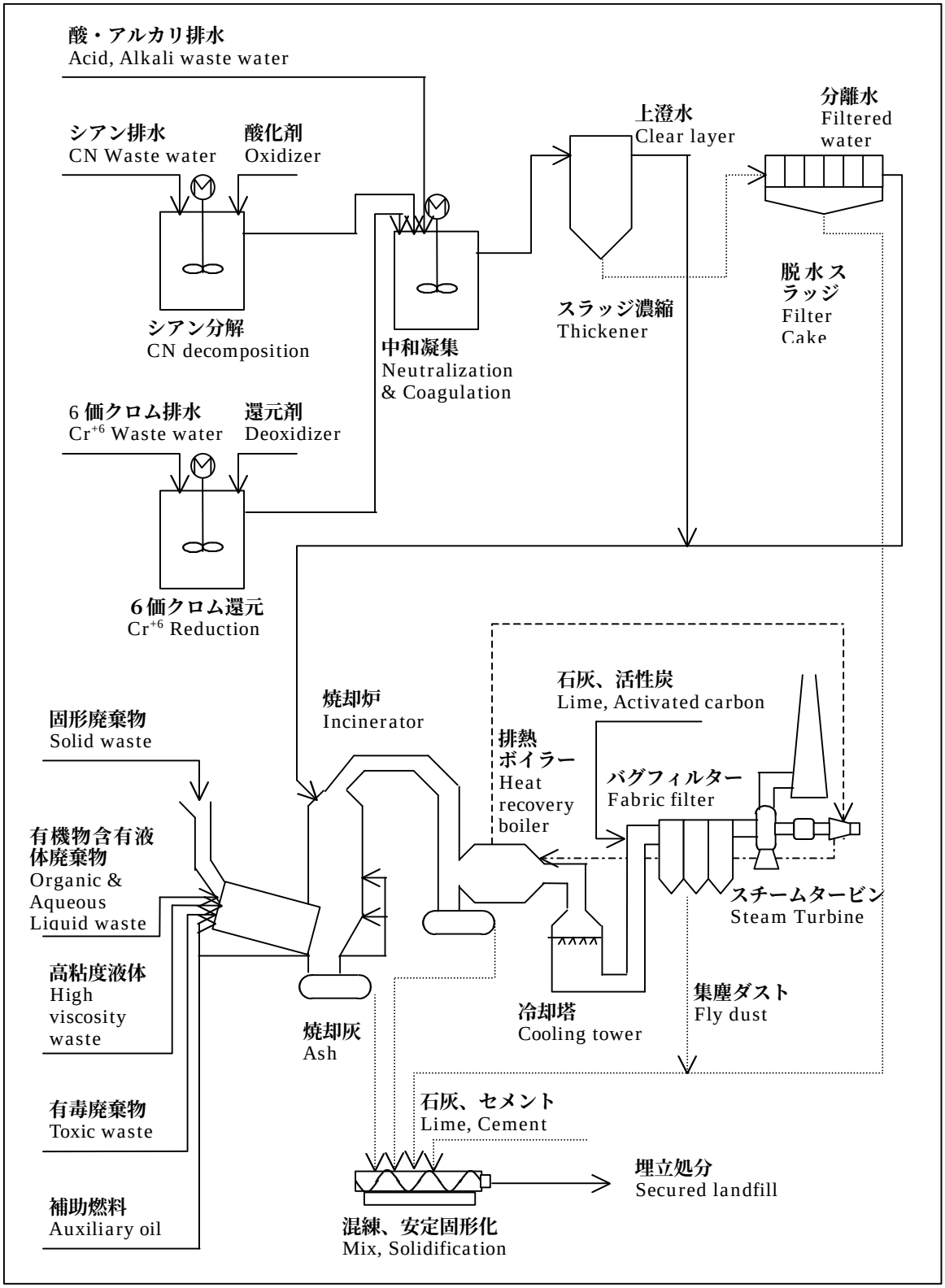
As measures to prevent pollution from the facility, the combustion exhaust gas is drawn into a heat recovery boiler to generate steam, then cooled in a cooling tower, dust collected by a fabric filter, and released from a chimney. Lime and activated carbon are blown into the exhaust gas at the inlet of the fabric filter. The lime removes sulfur oxides and hydrogen chloride from the exhaust gas, and the activated carbon removes the dioxins by adsorption. The facility is designed to European Union standards, which are more strict than Malaysia's standards, as regards the concentrations of sulfur oxides, hydrogen chloride, and dioxins. These parameters are measured once every quarter.

Incineration ash from the rotary kiln and dust collected in the fabric filter, the latter containing the activated carbon powder which adsorbed dioxin, are stabilized by solidification together with the dewatered sludge from the wastewater treatment. Lime and cement are mixed with the waste during this process, and the stabilized solid waste is then disposed of by landfill.

The bottoms of the landfill sites are covered with polyethylene sheets to prevent any chance of contaminated water seeping out into the groundwater. The water building up on the sheets is analyzed once a month, by drawing the water up through a sampling pipe, to confirm that no contaminated water is seeping out. On occasions when COD exceeds 100 mg/liter, the water from the bottom of the landfill is sucked up and burned in the incinerator. The company currently has a plan to build a wastewater treatment facility which would make incineration of the wastewater unnecessary. The groundwater

quality in the vicinity of the landfill sites is also being monitored by sampling well water.

Figure 1-6-1 Process Flow at the Kualiti Alam Treatment Plant



The main features of the Kualiti Alam treatment facility are summarized below:
(1) Closed system: None of the treated water is released outside the facility.
(2) Careful disposal: The incineration ash and dewatered sludge is solidified by kneading with cement before landfill disposal.
(3) Landfill precautions: The company manages the water quality of the leachate from the landfill and monitors the groundwater in the vicinity to ensure no problems occur after disposal.
(4) Innovative technologies: For example, to prevent dioxins contamination, activated carbon is blown into the combustion exhaust gas.

Four Danish consultants are currently stationed at the facility. They have experience with a similar system in Denmark, and that expertise is being utilized in managing the Kualiti Alam facility to meet European waste treatment standards.

(3) Treatment Charges

The waste coming into the Kualiti Alam facility is first analyzed and classified into a total of 13 categories based on the quantity of organic matter and the type and quantity of hazardous substances contained in the waste. Treatment charges are set separately for each category, and the charges are said to be considerably higher than in Japan. Figure 1-6-2 lists some of these 13 categories, and compares charges in Malaysia with the standard charges of a private-sector treatment company carrying out the similar treatment in Japan.

Figure 1-6-2 Comparison of Hazardous Waste Treatment Charges in Malaysia and Japan

Type of Waste	Malaysia Kualiti Alam (yen per ton)[1)]	Japan N Waste Treatment Co. (yen per ton)	Remarks
（1）Organic wastewater; incineration			
Heat value ＜ 18MJ/kg, Cl and/or S＜1% (X or Z)[2)]	56,700	10,000～20,000*	* Higher unit charge for high salinity
（2）Inorganic wastewater; physical and chemical treatment to render harmless			
Acid wastewater Cr ＜1 mg/L (X)	48,000	16,000～25,000**	** Higher unit charge for small quantity
Alkaline wastewater CN＜0.1 mg/L (X)	48,000	13,000～20,000	
Hexavalent chromium Cr＞1 mg/L (X)	59,000	33,000～65,000	
Cyanide wastewater CN＞0.1 mg/L (X)	59,000	33,000～65,000**	
Mercury wastewater Hg＞0.05 mg/L (K)	113,000	40,000～50,000**	
（3）Inorganic solid waste; landfill disposal			
Treatment to satisfy landfill standard (X, Z)	15,000	6,000～8,000**	
（4）Land transportation			
For distance of 50 km	1,600	6,000～8,000**	

1) Converted at 30 yen to one ringgit.
2) X, Z, and K are waste categories used at Kualiti Alam.

The Japanese Company N's charges per ton vary based on the amount of waste consigned. Charges per ton are lower for a large quantity, and higher for a small quantity. This is because a small quantity is more troublesome to treat and incur higher labor expenses per unit quantity than a large quantity. This manner of setting charges is common practice in Japan where labor expenses account for a high proportion of total costs.

The company N is located in Yokohama, a typical industrial zone in Japan, and carries out stabilizing treatment of hazardous waste generated by factories in the area. For example, the company reduces hexavalent chromium in wastewater to stable trivalent chromium. Resultant harmless sludge is transported and dumped at a final disposal site by other contract operators.

Looking at the treatment charges of Kualiti Alam and company N, some are in comparable ranges – hexavalent chromium and cyanide wastewater, for example – but Kualiti Alam's charges are generally much more expensive. Considering that everything costs far less in Malaysia than in Japan, Kualiti Alam's charges certainly do seem high. Figure 1-6-3 compares the two companies in terms of construction costs and other factors related to treatment costs.

Figure 1-6-3 Comparison of Construction Costs and Other Factors

Factor	Malaysia: Kualiti Alam	Japan: Company N
Construction costs (billion yen)	10	1
Throughput (tons per annum)	67,000	48,000
Workers	127	20

Quite clearly, Kualiti Alam's throughput is low in relation to its construction costs. Compared with the company's total treatment capacity of 211,000 tons per annum, the actual throughput of 67,000 tons equates to an average rate of operation of 32 percent. The incinerator operates virtually around the clock, but the physical and chemical treatment facility handled only 647 tons last year, only 13 percent of its annual capacity of 5,000 tons. One can easily surmise that the facility has high costs because of the low operating rate. Also, considering that all the equipment is so modern, fixed expenses related to the equipment, including depreciation costs, interest on funds, maintenance costs, would probably exceed 50 percent of total treatment expenses, whereas the percentage in Japan is said to be around 20 percent.

The number of employees at Kualiti Alam is also remarkably high. Although Malaysia's labor costs are said to be a third or quarter of Japan's, having so many workers must be a heavy burden. At the Japanese company N, each worker is responsible for two or three tasks. For example, if there is a wait of 40 minutes for cyanide decomposition to complete after wastewater and chemicals are charged into a reaction vessel, the worker will do other tasks, such as taking away the empty drums by forklift or fetching the next lot of chemicals from the warehouse.

The expenses for the four Danish consultants now working at the facility would also inflate personnel costs.

In addition, the practice of incinerating all wastes that have the total organic carbon (TOC) over 10 percent must considerably increase the supplementary fuel costs. For example, if inorganic sludge with no risk of heavy metal leaching has more than 10 percent charred timber or other material mixed in it, then a large amount of supplementary fuel would be needed to incinerate the sludge, which seems quite irrational. Kualiti Alam adopted this 10 percent standard from actual criteria used in Europe.

The company initially planned to minimize supplementary fuel costs by making effective use of the incineration heat of liquid wastes, such as waste oil, that have a high heat value. However, the amount of waste oil they were able to collect was far less than they expected, so they are apparently consuming 10 to 20 tons of fuel oil per day now. Fuel costs, then, must be another major burden. The company also plans to lower the TOC criterion to 5 percent in the future, which will increase the waste volume to be incinerated and push up fuel oil costs still further.

The Japanese company N, on the other hand, is a medium-size company in the waste treatment industry, and there are three other operators in the Yokohama area. Factories that generate hazardous waste get quotes from these companies for rendering their waste harmless, and then contract the job to the cheapest company that is also technically reliable. This is why waste treatment companies in Japan strive to adopt new technology and to rationalize processes, and try hard to keep charges lower than other companies so as to secure contracts with customers. But keeping costs down does not mean that they take any less care in performing the work. If the treated waste did not meet the standards stipulated by the Japanese government, the company would not only be penalized, it would lose credibility and no longer get any work.

The reasons for Kualiti Alam's high treatment charges are three-fold. The first is an inappropriately large investment in equipment in relation to the volume of waste being treated. The second is the adoption of advanced but costly technologies, such as a closed system for wastewater. The third is that the company does not put enough effort into reducing costs because it is a monopoly operation.

Although Kualiti Alam has major problems in regard to treatment costs, at the present time its treatment technology is reliable and it appears to be a facility to which Japanese companies can safely entrust their waste treatment.

Section 7
Environmental Impact Assessment in Malaysia

1. Malaysia's Procedural Requirements for Environmental Impact Assessment

In Malaysia, anyone proposing a new development project is obliged to carry out a number of procedures to evaluate the project's effects on the environment before implementation. The procedures are mandatory conditions for obtaining permission to operate a factory, and no new projects can get underway without completing these procedures.

The first procedure is the completion of environmental impact assessment (EIA). If the proposed project comes under one of 19 categories of activities prescribed under the Environmental Quality (Environmental Impact Assessment) Order 1987, the project proponent must prepare an EIA report in accordance with the stipulated procedures, submit it to the Director General of the Department of Environment (DOE), and obtain approvals.

If the proposed project is not a prescribed activity subject to EIA, Site Suitability Evaluation or Pre-Siting Evaluation is required to assess whether the site of the proposed factory or project is compatible with other land use in the area, particularly in regard to residential zones. Evaluation is required even when planning to site a factory in an industrial estate. The DOE carries out the evaluation by checking the development plan against environmental laws and regulations. In terms of both size and industry type, most factory construction projects undertaken by Japanese companies are required to complete only Site Suitability Evaluation.

In addition, depending on where the factory is to be located, a hazardous industry which may potentially generate waste that is injurious to health, such as a petrochemical plant, must submit a separate environmental risk analysis to the DOE. This provision applies to projects that require facilities to handle dangerous chemical substances. The project proponent carries out an environmental risk analysis of the facility and the proposed methods of handling the dangerous substances, and receives risk assessment of the project from the DOE.

These procedures are required not only for new projects, but may also be required for factory expansion and other such activities.

2. Environmental Impact Assessment System

EIA requirements apply to 19 categories of activities, such as airport construction, coastal reclamation, industries, and construction of waste treatment and disposal facilities, as prescribed in the schedule appended to the Environmental Quality (Environmental Impact Assessment) Order 1987. This order also sets forth the size and scope of the prescribed activities in each category. In general, these activities are large-scale development projects that potentially have severe impacts on the environment.

Of the prescribed activities, those in the industry category are most relevant to plant construction by Japanese companies. EIA requirements apply to factory and plant construction projects, exceeding a specified size, in seven types of industries: (1) chemical, (2) petrochemical, (3) non-ferrous, (4) non-metallic, (5) iron and steel, (6) shipbuilding, and (7) pulp and paper.

The EIA covers not only the likely environmental impact of the proposed project, but also evaluates aspects such as whether the best possible options have been selected for the project, and whether the project incorporates appropriate pollution control measures.

Figure 1-7-1 Prescribed Activities Subjected to EIA

1. Agriculture	(a) Land development schemes covering an area of 500 hectares or more to bring forest land into agricultural production. (b) Agricultural programmes necessitating the resettlement of 100 families or more. (c) Development of agricultural estates covering an area of 500 hectares or more involving changes in type of agricultural use.
2. Airport	(a) Construction of airports (having an airstrip of 2,500 meters or longer). (b) Airstrip development in state and national parks.
3. Drainage and Irrigation	(a) Construction of dams and man-made lakes and artificial enlargement of lakes with surface areas of 200 hectares or more. (b) Drainage of wetland, wild-life habitat or of virgin forest covering an area of 100 hectares or more. (c) Irrigation schemes covering an area of 5,000 hectares or more
4. Land Reclamation	Costal reclamation involving an area of 50 hectares or more.
5. Fisheries	(a) Construction of fishing harbours. (b) Harbour expansion involving an increase of 50 per cent or more in fish landing capacity per annum. (c) Land based aquaculture projects accompanied by cleaning of mangrove swamp forests covering an area of 50 hectares or more.
6. Forestry	(a) Conversion of hill forest land to other land use covering an area of 50 hectare or more (b) Logging or conversion of forest land to other land use within the catchment area of reservoirs used for municipal water supply, irrigation or hydro power generation or in areas adjacent to state and national parks and national marine parks. (c) Logging covering an area of 50 hectares or more. (d) Conversion of mangrove swamps for industrial, housing or agricultural use covering an area of 50 hectares or more. (e) Clearing of mangrove swamps on Islands adjacent to national marine parks.
7. Housing	Housing development covering an area of 50 hectares or more.
8. Industry	(a) Chemical : Where production capacity of each product or combined products is greater than 100 tones/ day (b) Petrochemical -- All sizes (c) Non-ferrous (Primary smelting) Aluminium -- all sizes Copper -- all sizes Others -- producing 50 tonnes/day and above of product (d) Non-Metallic Cement -- for clinker through out of 30 tonnes /hour and above Lime -- 100 tonnes/day and above burnt lime rotary kiln or 50 tones/ day and above vertical kiln. (e) Iron and steel-- Require in iron ore s raw materials for production greater than 100 tonnes/ day; or Using scrap iron as raw materials for production greater than 20 tones /day (f) Shipyards -- Dead Weight Tonnage greater than 5000 tonnes (g) Pulp and Paper Industry --Production capacity greater than 50 tonnes/day.
9. Infrastructure	(a) Construction of hospitals with outfall into beachfronts used for recreational purposes. (b) Industrial estate development for medium and heavy industries covering an area of 50 hectares or more. (c) Construction of expressways. (d) Construction of national highways. (e) Construction of new townships.
10. Ports	(a) Construction of ports (b) Port expansion involving an increase of 50 per cent or more in handling capacity per annum.
11. Mining	(a) Mining of minerals in new areas where the mining lease covers a total area in excess of 250 hectares. (b) Ore processing, including concentrating for aluminium, copper, gold or tantalum. (c) Sand dredging involving an area of 50 hectares or more.
12. Petroleum	(a) Oil and gas fields development. (b) Construction of off-shore and on-shore pipelines in excess of 50 kilometers in length. (c) Construction of oil and gas separation, processing, handling and storage facilities. (d) Construction of oil refineries. (e) Construction of product depots for the storage of petrol, gas or diesel (excluding service stations) which are located within 3 kilo meters of any commercial, industrial or residential areas and which have a combined storage capacity of 60,000 barrels or more.

13. Power Generation and Transmission	(a) construction of steam generated power stations burning fossil fuels and having a capacity of more than 10 megawatts. (b) Dams and hydroelectric power schemes with either or both of the following. (i) dams over 15 meters high and ancillary structures covering a total area in excess of 40 hectares; (ii) reservoirs with a surface areas in excess of 400 hectares. (c) Construction of combined cycle power stations. (d) Construction of nuclear-fueled power stations.
14. Quarries	Proposed quarrying of aggregate, limestone silica quartzite, sandstone, and decorative building stone within 3 kilometers of any existing residential or industrial area, or any area for which a license, permit or approval has been granted for residential or industrial development.
15. Railways	(a) Construction of new routes. (b) Construction of branch lines
16. Transportation	Construction of Mass Rapid Transport projects.
17. Resorts and Recreational Development	(a) Construction of coasted resort facilities or hotels with more than 80 rooms. (b) Hill station resort or hotel development facilities in national parks. (c) Development of tourist or recreational facilities in national parks. (d) Development of tourist or recreational facilities on islands in surrounding waters which are gazetted as national marine parks.
18. Waste Treatment and Disposal	(a) Toxic and Hazardous Waste (i) Construction of incineration plant (ii) Construction of recovery plant (off-site) (iii) Construction of wastewater treatment plant (off-site) (iv) Construction of secure landfill facility (v) Construction of storage facility (off-site) (b) Municipal Solid Waste (i) Construction of incineration plant (ii) Construction of composting plant (iii) Construction of recovery/ recycling plant (iv) Construction of municipal solid waste landfill facility (c) Municipal Sewage (i) Construction of wastewater treatment plant (ii) Construction of marine outfall.
19. Waste Supply	(a) Construction of dams, impounding reservoirs with a surface area of 200 hectares or more. (b) Groundwater development for industrial, agricultural or urban water supply of greater than 4,500 cubic meters per day.

Source： DOE/MOSTE, *Environmental Requirements: A Guide For Investors*, 1996

(1) Process of Environmental Impact Assessment

The EIA process begins with the project proponent preparing a Preliminary Environmental Impact Assessment Report for submission to the DOE in order to receive Preliminary Assessment. Information to be provided in the Preliminary EIA Report includes the project name, predicted environmental impact, abatement and mitigating measures, and various technical data, as well as the outcome of public participation (generally, opinions given from reading the report).

The Preliminary EIA Report received by the DOE is reviewed by a panel consisting of the DOE and other government agencies relevant to the report contents. If there are no problems, the report is approved and the government agencies with the jurisdiction over the development project are notified. If the project involves construction of a factory, for example, the Malaysia Industrial Development Authority (MIDA) and other agencies are notified and approve the project implementation.

If the Preliminary Assessment indicates that the project will likely have a major impact on the environment, the project proponent is required to prepare a Detailed Environmental Impact Assessment Report for submission to the DOE. The submitted Detailed EIA Report is assessed by a Review Panel made up of experts and consultants convened by the Director General of the DOE. The accepted report is made available at DOE offices and libraries for public comment, and is then passed to the government agencies with the jurisdiction over the project for approval to proceed. Projects predicted to have a major environmental impact, such as steel-making, cement, and coastal reclamation projects, are required to prepare a Detailed EIA Report from the outset.

Impact assessment takes approximately three months for the preliminary assessment only. In 1997, a total of 414 cases of environmental impact assessment were conducted during the year, and most of these were completed at the preliminary assessment stage.

Further particulars about EIA procedures and an overview of how the EIA process is conducted are available in "A Handbook of Environmental Impact Assessment Guidelines," published by the DOE. In addition, "Specific Environmental Impact Assessment Guidelines" are being prepared for specific types of industries, and there are currently 16 different sets of guidelines available.

(2) Registration of Environmental Impact Assessment Consultants

To improve the quality of EIA reports, Malaysia in 1994 initiated a registration system for consultants who carry out assessment. The purpose is to clarify the consultant's area of specialization, services, and scope of responsibility. The DOE registers consultants who pass a certain standard of expertise. As of 1997, 216 individuals and 63 consulting firms were registered.

The current registration system is not based on laws. The DOE wants to have registration of consultants made mandatory under the law, and has submitted a proposed amendment to the Environmental Quality (Environmental Impact Assessment) Order 1987 to the Attorney General. The proposed amendment recommends incorporation of registration standards, rules of ethics for consultants, and criteria for revoking registration.

3. Site Suitability Evaluation

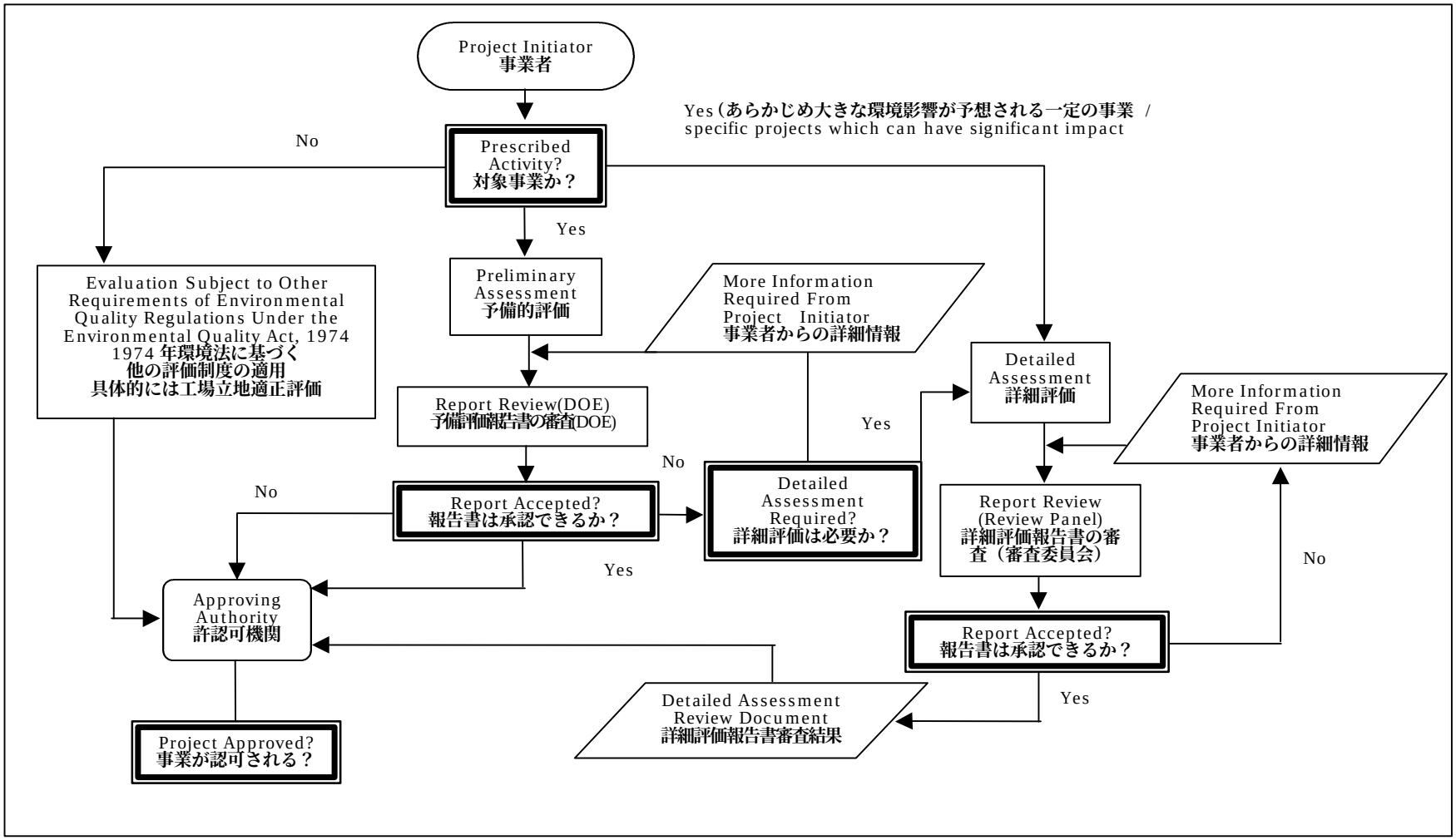
Site Suitability Evaluation is required for activities which are not subject to the EIA system. Whereas the EIA system emphasizes prevention of environmental impacts by large-scale development projects, Site Suitability Evaluation assesses whether a project will cause any environmental problems, particularly in relation to residential areas, in the vicinity of the proposed factory construction site. The aim is to encourage companies to select appropriate factory sites. The evaluation is carried out based on the DOE's brochure, "Guidelines for the Siting and Zoning of Industries." Any person wishing to build a factory is obliged to contact the DOE in regard to site suitability.

On receiving an inquiry from a person proposing to build a factory, the DOE evaluates the site suitability in terms of the surrounding land use, the capacity for additional pollution load, problems of waste disposal in the area, and regulations regarding buffer zones stipulated in the guidelines. Depending on the assessor's opinion, the project proponent may be directed to change the proposed site of the factory.

Under the guidelines' provisions regarding buffer zones, industries are classified into four categories: (1) Light industry A, (2) Light industry B, (3) Medium industry, and (4) Heavy industry. The desirable buffer distance from residential areas is specified separately for each of these categories. For example, the provisions state that a buffer distance of 250 meters is desirable for Medium industry, a category of industry that uses toxic and hazardous substances as raw material and generates some gaseous emission, industrial effluent, noise, odor and scheduled wastes.

Since a high proportion of Japanese companies in Malaysia are assembly industries in the electrical and electronics sector, most companies will have to conduct only Site Suitability Evaluation as the required EIA procedure.

Figure 1-7-2 Outline of Environmental Impact Assessment Procedure



Source：DOE/MOSTE, *Environmental Impact Assessment (EIA) Procedure and Requirements in Malaysia*, 1994

Figure 1-7-3 Site Suitability Evaluation: Prescribed Activities and Size

Industries	Descriptions and Standard Requirements	Buffer zone
Light A	• Industries shall not generate excessive noise • Industries shall not accommodate stacks or chimneys thus producing no gaseous emissions • Industries shall not discharge industrial effluent apart from sewage and kitchen waters and non-toxic solid wastes • Industries shall not use any raw materials which are toxic and hazardous and therefore will not produce any scheduled wastes • Industries shall have height restrictions determined by the Local Authority • Industries shall use electricity and gas as fuels • Industries shall not use any radioactive material and scheduled wastes Note: Light industries (Type A) shall not produce any industrial emissions and significant discharges	30 m
Light B	• Industries shall not generate excessive noise • Industries shall not accommodate stacks or chimneys thus producing no gaseous emissions • Industries shall not use any raw materials or produce any scheduled wastes • Industries shall have height restrictions determined by the Local Authority • Industries shall produce industrial effluent that can be treated on site before being discharged to meet Standard A or B of the Environmental Quality (Sewage and Industrial Effluent) Regulation 1979 depending on the site • Industries shall have compatibility in industrial mixing, eg. between food based industries and leather-based industries • Industries shall not use any radioactive materials or scheduled wastes Note: Industrial Effluent discharge and gaseous emissions shall meet the relevant Environmental Quality Regulations as stipulated in the Environmental Quality Act, 1974	50 m
Medium	• These industries shall generate significant noise from machinery, generators etc but which could be controlled to meet the level not exceeding 65 dB at the factory boundary, and not exceeding 55 and 45 dB at the residential/buffer zone boundary during day and night time respectively • Industries shall emit some gaseous emission but which can be controlled to comply with the Environmental Quality (Clean Air) Regulation 1978 • The industries shall produce some industrial effluent that can be treated on site before being discharged to meet the Environmental Quality (Sewage and Industrial Effluent) Regulation 1979, standard A or B depending on the site • These industries shall use toxic and hazardous raw materials in its production • The industries shall produce scheduled wastes but which can be treated on site to comply with the Environment Quality (Scheduled Wastes) Regulation 1989 or disposed off from their premises • These industries shall produce fumes and odors that can possibly affect the workers health and the neighboring plant, but for which design solutions are available for prevention and shall comply with the Environment Quality (Clean Air) Regulation 1978 • The stack height shall conform to the production capacity of the specific plant to be based on air quality modelling and simulation with the DOE approval • The industries shall be located in designated industrial estates or zones with good compatibility within the industrial estates and zones to ensure good industrial mixing • These industries shall not use any radioactive materials Note: All discharges and emissions shall meet the relevant Environmental Quality Regulations as stipulated in the Environment Quality Act, 1974	250 m
Heavy	• Heavy industries must be sited in designated industrial estates or designated industrial zones with sufficient buffer zones from residential areas, livestock farms, agricultural farms, recreation areas and tourist designated areas A minimum distance from the fence of the industry to the nearest residential area is 500 meters, to be finalized by the EIA Report • These industries shall generate excessive noise from its operations but for which design solutions are incorporated in the form of appropriate high technologies to reduce the noise levels generated to a level to meet the WHO recommended level of not greater than 75 dB at the factory boundary and not exceeding 55 and 45dB at the residential /buffer zone boundary during day and night time respectively	500 m

	• These industries shall produce gaseous emissions at rates, volumes and concentrations that will require datailed engineering design incorporated into the operation and control mechanisms and other mitigation measures to reduce these emissions to comply with the Environmental Quality (Clean Air) Regulation 1978. • Stack heights shall be determined by detailed air quality modelling and simulations within the EIA Report • These industries shall produce industrial effluent at rates, volumes and concentrations that will require detailed engineering design incorporated into the operation and control mechanisms to meet the Environmental Quality (Sewage and Industrial Effluent) Regulation 1979 and/or to dispose such wastes. to the Central Treatment Facilities • The industries shall use radioactive materials and scheduled wastes which are toxic and hazardous for which pollution control technology design solution and mitigation measures shall meet the necessary approvals • These industries shall generate scheduled wastes which cannot be treated on-site or which exceed the levels recommended in the Environmental Quality (Scheduled Wastes) Regulation 1989. Thus in compliance with the above regulation the industries shall incorporate necessary technologies to reduce the scheduled wastes generation to the acceptable level or they can be disposed for treatment at a centralized scheduled wastes treatment plant, or recycled within its premise, or sold to other parties for the purpose of recycling • Siting within an industrial estate or zones should take into consideration the compatibility in industrial mixing. • Hot water discharges shall be supported by thermal plume modelling and simulations to be clearly presented in the EIA report Note: All discharges and emissions shall meet the relevant Environmental Quality Regulations as stipulated in the Environmental Quality Act, 1974 and using appropriate control measures.	
Special	• Industries which by their process description and plant outputs are involved in the manufacturing of products that are generally accepted being categorized as high technology based products. • Industries that utilize high advance and clean technology in their process and control mechanisms, as verified by EIA documents, and backed up by examples of parent plants or other plants operating elsewhere. • Industries that will eliminate or minimize emissions, wastewater discharges and scheduled waste production to meet the relevant Environmental Quality Regulations as per Environmental Quality Act (1974) with sufficient large margins. • Industries shall be located within designated special industries zones, being compatible with the neighboring plants, which are designed to be environmentally friendly. Note: Near-zero emissions and discharge shall be achieved by incorporating clean technologies.	200 m

Source： DOE/MOSTE, *Environmental Requirements: A Guide For Investors*, 1996