A Project Consigned of the Environment Agency in 1999

Overseas Environmental Measures of Japanese Companies (Malaysia)

Research Report on Trends in
Environmental Considerations related to
Overseas Activities of Japanese Companies
FY 1999

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Global Environmental Forum

Preface

Japanese companies have been prominent in setting up operations in Southeast Asia. They play a major role in spurring economic development in their host countries and are continuing to build and expand their business activities in the region.

However, as a legacy of its rapid economic growth and industrialization, Southeast Asia suffers environmental pollution problems which are now causing serious concern. Although the region has begun to address these problems through industrial pollution controls and other initiatives, measures are still not sufficient due to the shortages of financial and human resources, as well as technical expertise and experience.

Against this backdrop, Japanese companies, with their advantages of advanced environmental technologies and previous experience in overcoming severe industrial pollution at home, are expected to take positive steps toward tackling environmental issues in Southeast Asia. Furthermore, Japanese companies are seen as potential leaders in promoting industrial pollution controls by introducing innovative environmental practices. Within Japan, too, there is intensifying public scrutiny of the environmental considerations related to activities of Japanese companies operating in Southeast Asia.

In 1995, the Environment Agency of Japan asked the Global Environmental Forum to conduct a questionnaire survey of the measures being taken by Japanese companies to protect the environment in the four Southeast Asian countries of Malaysia, Thailand, Indonesia, and the Philippines. Many of the companies that participated in the survey indicated a need for further information. They requested a handbook or guide about environmental issues in the host country, to help them carry out more substantial environmental measures. There was also a demand for corporate case studies to be prepared, describing the model cases of innovative environmental practices that Japanese companies are implementing in their offshore facilities.

Following these requests, the Environment Agency in 1996 commissioned the Global Environmental Forum to carry out a research program into the environmental considerations related to overseas activities of Japanese companies. The research is aimed at collecting information and cases that might be useful in encouraging Japanese companies to implement environmental measures in the countries in which they operate. The results were published as a series of research reports; the Philippines edition in 1996, the Indonesia edition in 1997, and the Thailand edition in 1998. This Malaysia edition, the fourth in the series, reports the findings of the research project commissioned by the Environment Agency in 1999.

We hope that this report will enable Japanese companies already operating in Malaysia to improve their environmental practices, and serve as a useful resource for other companies contemplating a future move into Malaysia.

We would like to express our thanks and appreciation to all those who assisted us in this project. The Japanese Chamber of Trade and Industry in Malaysia (JACTIM) and its Management Committee provided invaluable assistance in obtaining reference materials and in introducing companies willing to participate in the survey. The Japan External Trade Organization (JETRO) Kuala Lumpur Center kindly arranged contacts with the Department of Environment, Malaysia and other environment-related government agencies. We are grateful to many Japanese companies in Malaysia, and to the Department of Environment and other government agencies, who gave generously of their time and cooperated in gathering information. In addition, we acknowledge the help and support received from the Japan Chamber of Commerce and Industry and from JETRO in Japan.

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Contents

■ How to Use This Book

This book consists of two chapters and appendices. Chapter 1 describes the environmental issues that Malaysia now faces, and summarizes Malaysian laws and regulations on the environment. Chapter 2 presents case studies illustrating the practical measures being taken by Japanese companies in Malaysia (manufacturing sector) to safeguard the environment. The appendices provide useful information for gaining a deeper understanding of the topics raised.

Note that the term *Japanese companies in Malaysia*, as used in this book, refers to corporate members of the Japanese Chamber of Trade and Industry in Malaysia (JACTIM) and members of the JETRO Kuala Lumpur Center, irrespective of any special criteria such as the percentage of equity invested from Japan.

It should also be noted that the Japanese companies who took part in the field research for this survey were all manufacturing companies. For this reason, the case studies discussed in Chapter 2 are all taken from the manufacturing industry, and the primary emphasis of this book is on environmental practices in the manufacturing sector.

This book is designed so that each chapter, and each section within each chapter, can be read independently. Readers may select relevant information according to their particular needs.

The following describes how this book is organized.

Chapter 1 is divided into seven sections which present up-to-date information about Malaysia's environmental problems, and laws and regulations:

Section 1: Malaysia and Japanese Companies
Section 2: Current Environmental Issues in Malaysia
Section 3: Environmental Administration and Legislation in Malaysia
Section 4: Water Pollution Management
Section 5: Air Pollution Management
Section 6: Industrial Waste Management
Section 7: Environmental Impact Assessment in Malaysia

Section 1 sketches the history of Japan's relationship with Malaysia and the expansion of Japanese companies into the country. Section 2 describes specific environmental problems that affect Malaysia at present, namely water pollution, air pollution, and waste issues.

The remaining sections in Chapter 1 explain and provide detailed information, categorized by topic, about the environmental legislation and administrative structures in Malaysia that are of primary importance when formulating a corporate environmental management plan. Section 3 describes Malaysia's environmental administrative framework and the system of laws and regulations pertaining to industrial pollution, and summarizes the various environmental formalities that a company must complete to establish an industrial operation in Malaysia. Sections 4, 5, and 6 outline legal mechanisms and regulatory standards in three areas - water pollution, air pollution, and industrial waste - as essential aspects of industrial pollution control. The last section, Section 7, gives an overview of Malaysia's Environmental Impact Assessment (EIA) system.

The information in Chapter 1 was compiled mainly from interviews with officials of the Department of Environment and from materials published by the Malaysian government.

In Chapter 2, Section 1 summarizes the features and methods by which Japanese companies in Malaysia, particularly in the manufacturing sector, are attempting to protect the environment. This introduction is followed by thirteen examples of innovative environmental practices being carried out by companies covered in the field research. The case studies are divided into three sections:

Section 2: Cases of Meeting Strict Wastewater Standards (five examples)
Section 3: Cases of Establishing an Environmental Management System (four examples)
Section 4: Other Examples of Innovative Environmental Practices (four examples)

Efforts by the manufacturing sector and other industries to protect the environment in Malaysia are aimed primarily at controlling water pollution, which was therefore the main focus of the cases we selected. In Section 3, we included examples of setting up an environmental management system, reflecting the strong commitment among Japanese companies in Malaysia in obtaining ISO 14001 certification and building environmental management systems. In addition, Section 4 includes examples of preventive efforts to safeguard the environment.

The following reference materials are provided in the appendices.

Appendix 1: Environmental Quality Act 1974 (complete text of the 1998 amended Act)
Appendix 2: Environmental Quality (Scheduled Wastes) Regulation 1989 (excerpts), which prescribes the treatment and disposal of scheduled wastes, together with the First Schedule of the Regulation which lists the wastes subject to this legislation.
Appendix 3: Current State of Environmental Practices of Japanese Companies in Malaysia and Other Asian Countries
Appendix 4: Sources of Environmental Information in Malaysia and Japan

Appendix 1 is the Environmental Quality Act 1974, discussed in Section 3 of Chapter 1. The complete text is included here for the better understanding of the reader. Appendix 2 contains excerpts from the environmental regulations setting out the precise requirements for the treatment and disposal of scheduled wastes in Malaysia.

The currency conversion rate used in this book is approximately 30 yen to one Malaysian ringgit, the rate as of February 2000.

As for the particulate matter measured in relation to air pollution, there are three definitions; (1) suspended particulate matter (SPM), which is measured after eliminating 100 percent of particles with a diameter of 10 microns or more, the measurement adopted in Japanese environment standards, (2) PM10, which is measured after eliminating 50 percent of particles with a diameter of 10 microns or more,(3) total suspended particulates (TSP), which includes all particles regardless of size, and (4) dustfall. Of these, PM10, TSP, and dustfall are used in Malaysia.

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.

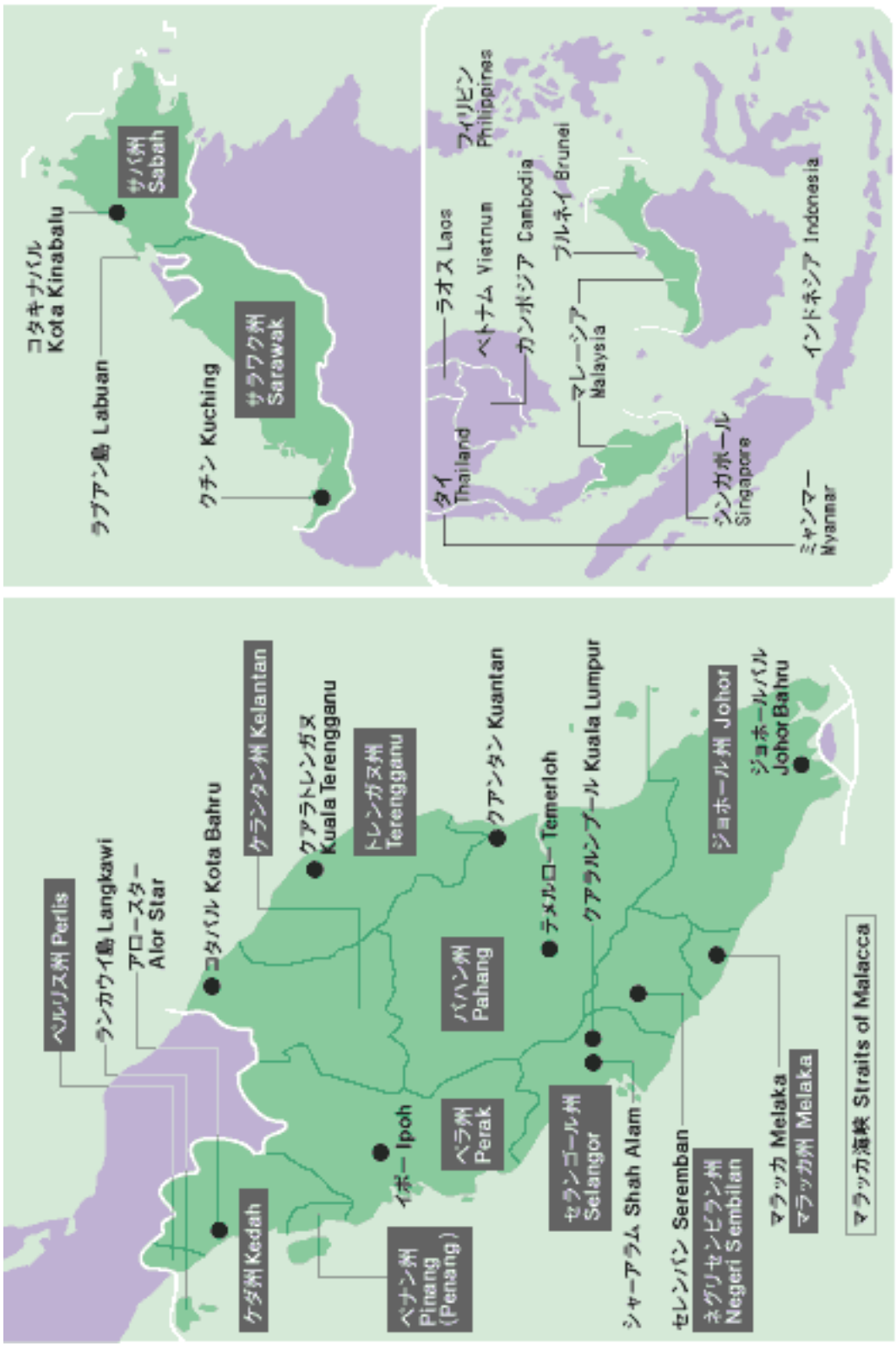
Economic interests are pivotal to Japan's relationship with Malaysia today, but contact between the two countries goes a long way back. The earliest trace of Japanese presence in Malaysia is a record stating that a Japanese Buddhist monk, Shinnyo, died at Johor Bahru while on a pilgrimage to India in 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.

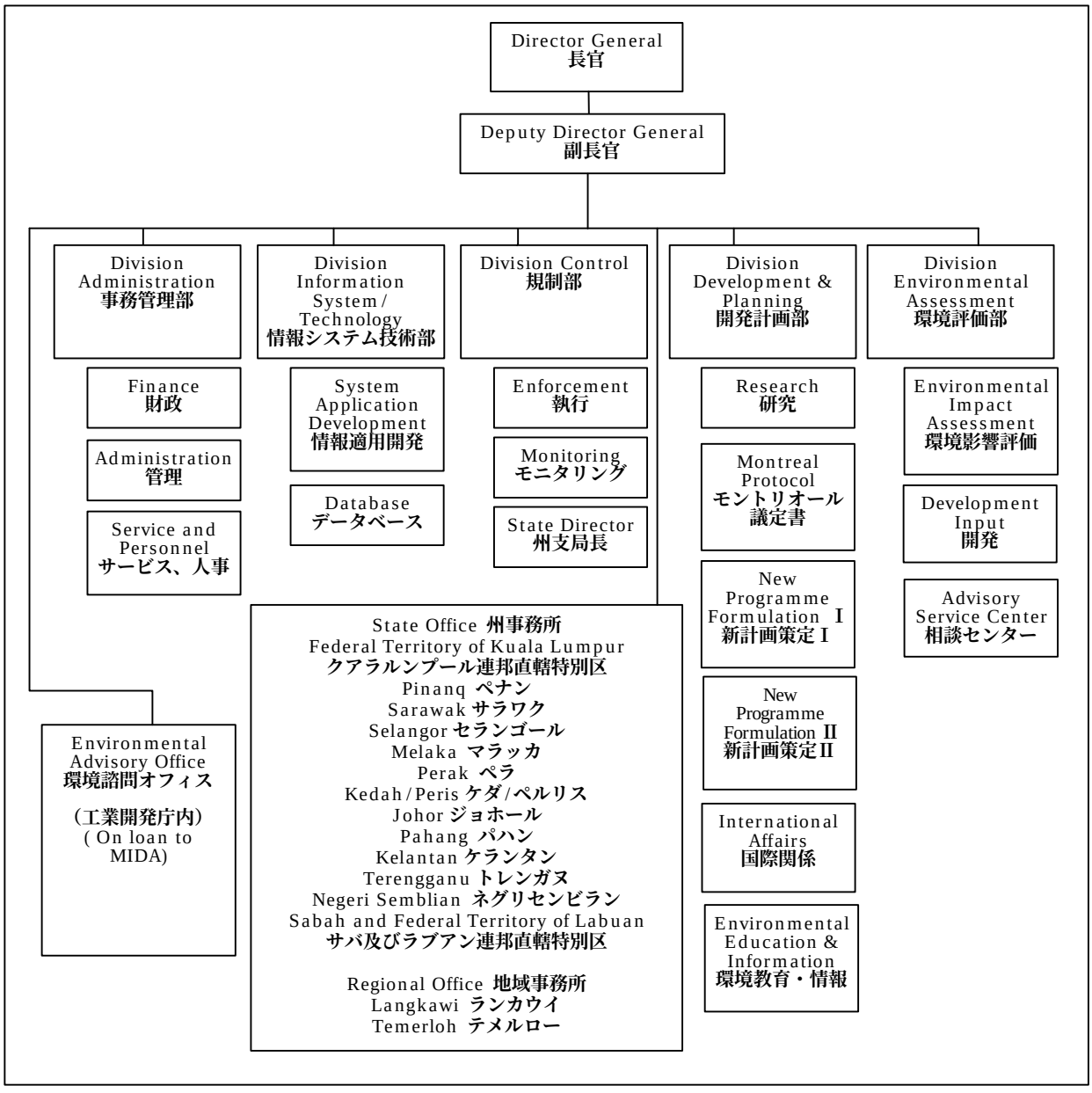
Another environmental administrative organization in Malaysia is the Environmental Quality Council. It has the office within the DOE, and its role is to advise and provide guidance to the Minister of Science, Technology and Environment. The council membership is made up of the directors of environment-related 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

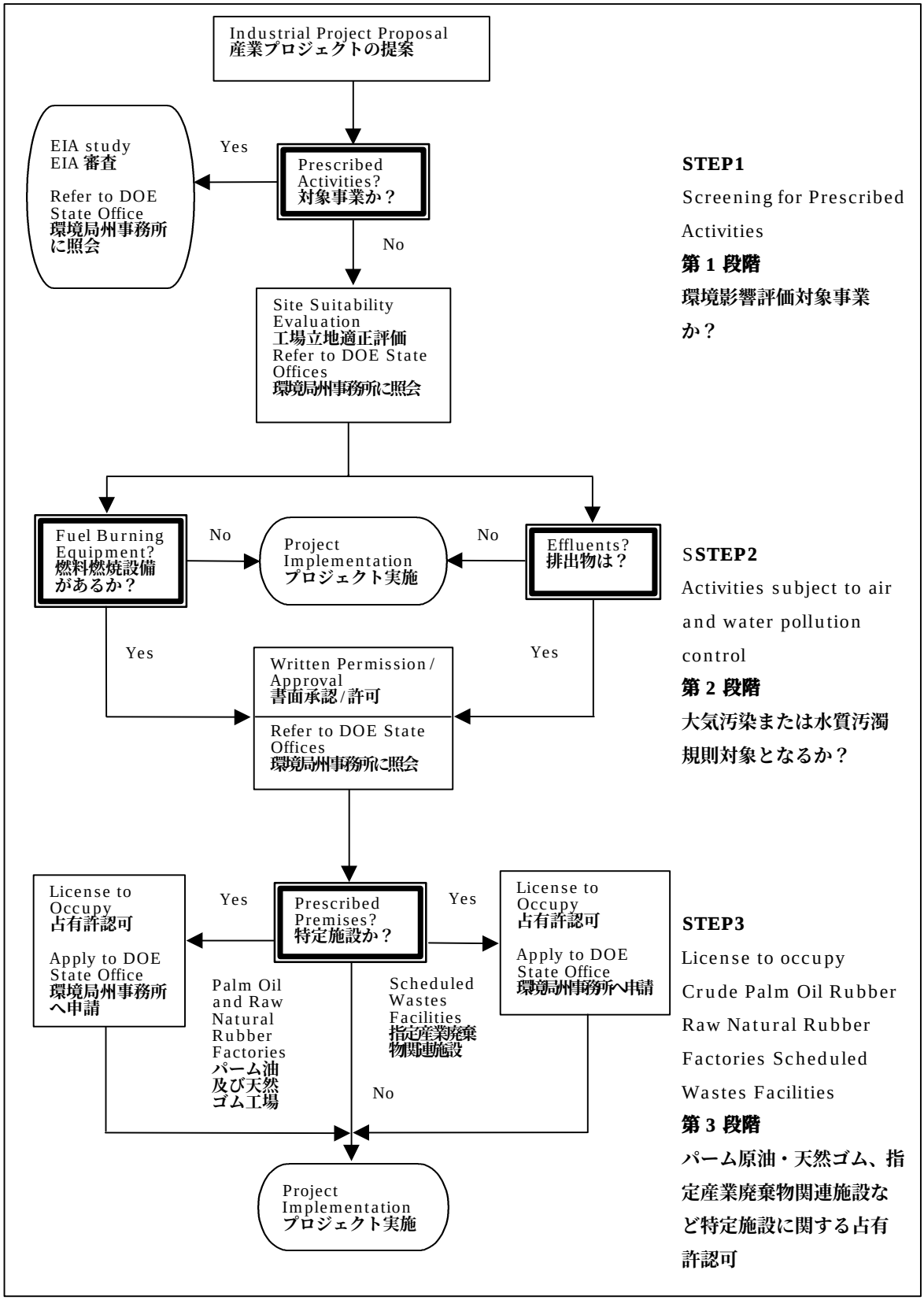
While Japanese companies are expected to properly comply with wastewater controls and all other environmental controls in Malaysia, anyone who proposes to build a new plant or to expand existing facilities must go through a variety of environment-related formalities at each stage of project planning 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.

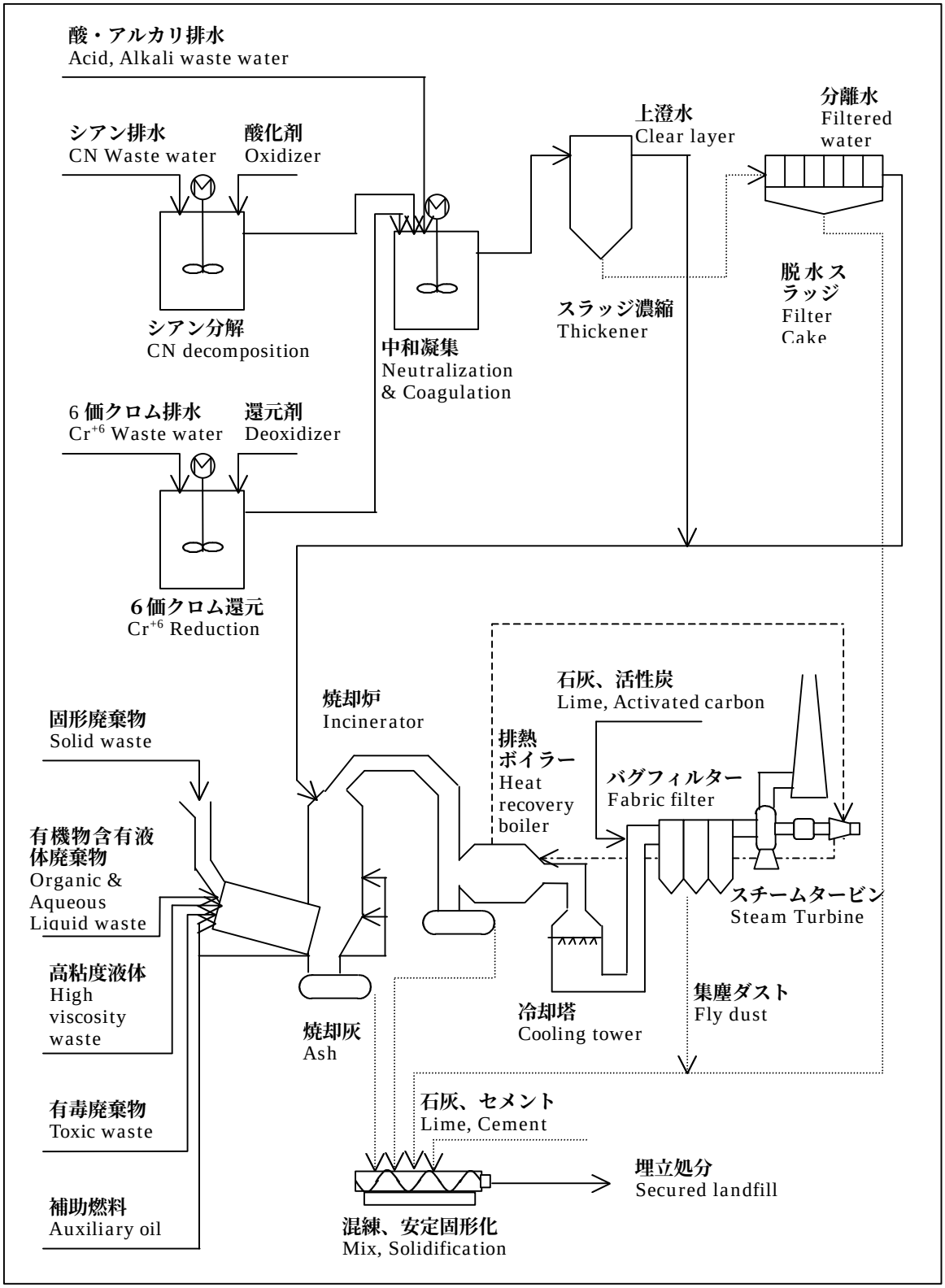
As measures to prevent pollution from the facility, the combustion exhaust gas is drawn into a heat recovery boiler to generate steam, then cooled in a cooling tower, dust collected by a fabric filter, and released from a chimney. Lime and activated carbon are blown into the exhaust gas at the inlet 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

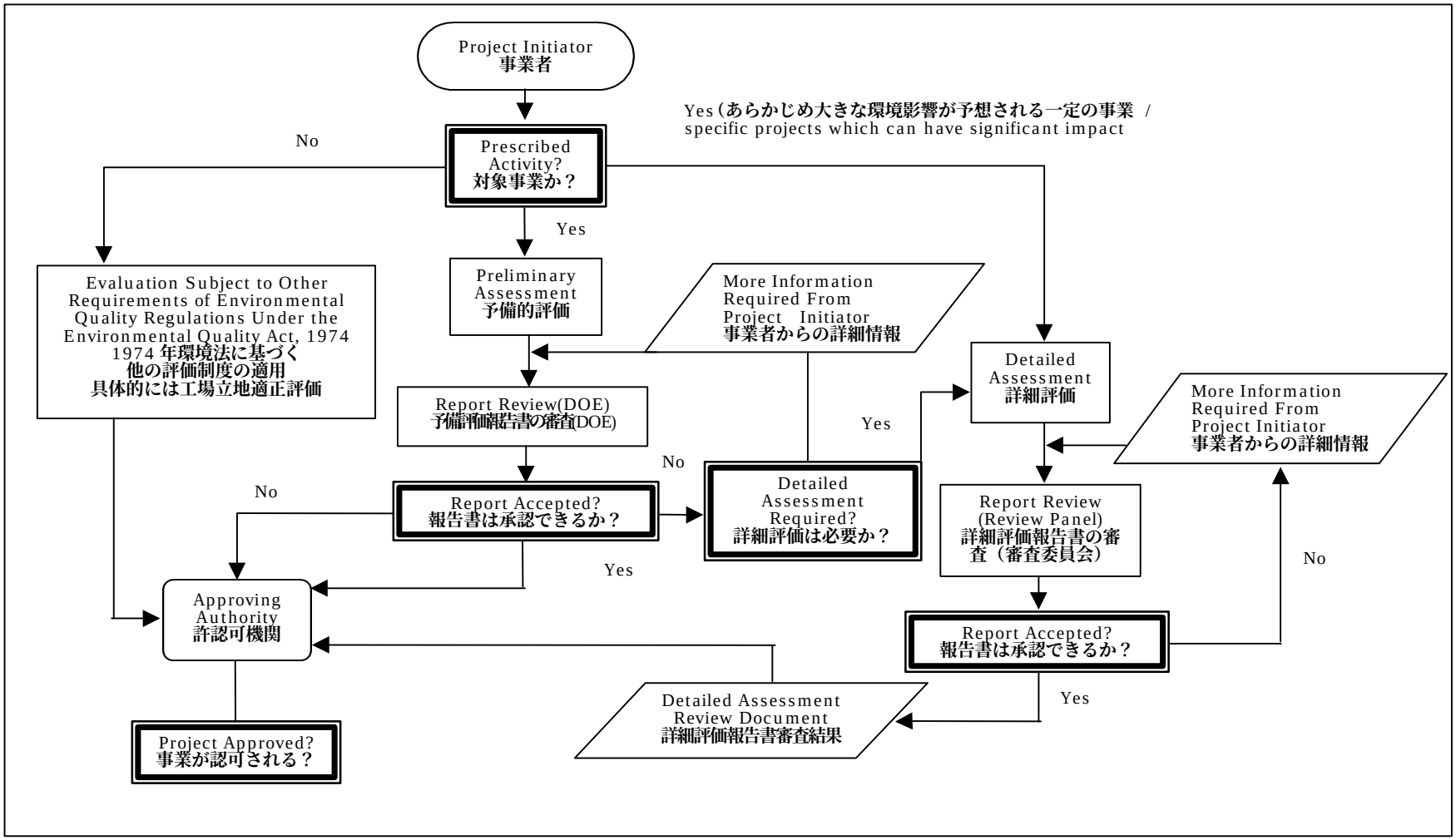
Site Suitability Evaluation is required for activities which are not subject to the EIA system. Whereas the EIA system emphasizes prevention of environmental impacts by large-scale development projects, Site Suitability Evaluation assesses whether a project will cause any environmental problems, particularly 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

Chapter 2

Environmental Conservation

by Japanese Companies in Malaysia

: Case Studies of Corporate Practices and Policies

Japanese companies in Malaysia are actively addressing environmental issues and have adopted sound environmental practices as an integral part of their corporate activities. As well as implementing pollution controls in compliance with the regulations, many companies are taking voluntary measures that go beyond legal requirements, such as phasing out trichloroethylene and other pollutants. Japanese companies in Malaysia are also strongly driven to build environmental management systems; almost all are aiming at ISO 14001 certification and many are already certified. Chapter 2 presents thirteen real-life case studies of the environmental practices of Japanese companies, most of which belong to the manufacturing sector in Malaysia, based on the findings of on-site survey of a dozen or more corporate members of the Japanese Chamber of Trade and Industry in Malaysia (JACTIM). Section 1 gives an overview of the various environmental practices of these companies. The case studies presented in Sections 2 to 4 are arranged under three topics: five cases of meeting strict wastewater standards (Section 2), four cases of establishing an environmental management system (Section 3), and four other examples of innovative environmental practices (Section 4).

Section 1
Japanese Companies in Malaysia and their Environmental Conservation

The on-site survey for this report was conducted between September and November 1999, and covered a dozen or more Japanese manufacturers and other companies in Malaysia. In each case, we visited the actual factory premises and gathered information about the companies' production processes and their efforts to implement environmental controls. The site visits took place at a time when Malaysia had surmounted the worst of the economic and currency crisis by self-imposed regulations on capital transactions and by a fixed exchange rate system. Most Japanese companies, which are predominantly export-oriented manufacturers in the electrical and electronic sector, were also well on the way to recovering their past production levels. The next sections of this chapter discuss thirteen examples of specific environmental practices put in place by Japanese companies in Malaysia. All of these companies are implementing pollution controls to the same or to a greater extent than at home, particularly in regard to industrial waste management and effluent standards, which are stricter in Malaysia than in Japan. It was evident, too, that most of the companies that we visited for this survey are taking various initiatives to develop voluntary environmental practices, such as building environmental management systems, for example.

1. Corporate Approaches to Environmental Issues

(1) Sustained efforts toward sound environmental practices

Almost all of the Japanese companies in this survey were manufacturing industries, except for one company that carries out surface treatment of metal plating. The surveyed companies have been operating in Malaysia for different lengths of time, from about 30 years ago to just a few years ago, and although they also differed in size. They, however, shared a common awareness that "implementing environmental controls is an daily corporate activity; we intend to maintain environmental efforts in advance of any new regulatory requirements."

Many of the Japanese companies operating in Malaysia are manufacturers, primarily in the electrical and electronics sector, and their production processes generally do not generate any major pollution load. Nevertheless, these companies are willing to incorporate proper environmental practices as part of business management is obviously prompted in part by the global environmental strategy of the parent company in Japan, which encourages the implementation of environmental controls wherever possible and wherever the host country may be. There also is a major background factor, the companies' own awareness of environmental controls and practices as a matter of course within their business activities. In addition, many Japanese companies in Malaysia view environmental practices from the perspective of cost effectiveness, and see that building an environmental management system can reduce energy costs and production costs. These various factors have together resulted in excellent environmental practices being adopted by Japanese companies as their daily business activities.

Malaysia's approach to environmental matters is another factor influencing corporate environmental policies. That approach is distinguished by very strict regulations on effluents and solid waste, and by greater administrative performance to make those regulations effective in practical terms than other Southeast Asian nations. Industries must therefore be vigilant in ensuring that routine pollution controls are properly carried out. Moreover, most Japanese companies in Malaysia are global corporations that have a high profile internationally, and the product brands they manufacture are household names to Malaysian people. The business activities of Japanese companies, including their environmental practices, are closely watched and any failure in regard to environmental matters would severely damage their brand image. This is another reason for the serious effort that Japanese companies are putting into environmental practices.

The basic direction of the environmental policies of Japanese companies in Malaysia is to control pollution, primarily effluents and industrial waste. However, some companies in this survey were going beyond mere compliance with the regulations and are aiming to reach stringent effluent standards of their own. One company, for example, is voluntarily monitoring the groundwater in the factory environs because of concern about environmental risks. Most Japanese companies are also initiating measures in advance of regulatory requirements, including the banning of CFCs, which deplete the ozone layer, and organochlorine chemical substances such as trichloroethylene. There is also a strong drive among Japanese companies to obtain ISO 14001 certification, the international standard of environmental management. Almost all companies are already certified or are preparing to obtain ISO 14001 certification. There was even a case where an affiliate in Malaysia was accredited a year ahead of the deadline set by the head office in Japan.

It should be noted, however, that the companies covered in this survey were not typical representatives of Japanese companies operating in Malaysia in general. In fact, the majority of companies fit the following description: (1) affiliate financed by a well-known large corporation in Japan; (2) manufacturing industry in the electrical and electronic sector; and (3) factory site located in the environs of Kuala Lumpur. In this survey, we were unable to obtain precise information about the environmental practices of small companies, or of companies in industries other than manufacturing.

(2) The difficulties of dealing with industrial waste

The environmental issue of gravest concern to Japanese companies in Malaysia is the problem of dealing

with the solid waste generated from production processes and wastewater treatment.

As discussed in Section 6 of Chapter 1, the industrial waste regulations in Malaysia are based on a raft of rules and orders governing scheduled wastes, formulated in 1989 under the provisions of the Environmental Quality Act 1974. The regulations stipulate that scheduled wastes may only be finally disposed of at a disposal facility designated by the Director General of the Department of Environment (DOE). However, when the regulations came into effect in 1989, no such designated disposal facilities existed in Malaysia. Thus, for the next decade or so, until 1997 when a scheduled waste disposal facility became partially operative, Japanese companies wishing to dispose of their waste in accordance with the law were forced to store all waste within their own premises. As a result, many Japanese companies exceeded the permissible limits for the amount of scheduled wastes stored on-site, and it was not unusual to see factories with every spare corner overflowing with drums packed with scheduled waste. In a desperate attempt to remedy the situation, some Japanese companies used to export waste to the United States and elsewhere, ostensibly for the purpose of resource recovery from sludge containing valuable metals. Export of wastes is now virtually prohibited since Malaysia became a signatory to the Basel Convention.

The designated disposal facility run by Kualiti Alam Sdn. Bhd. became partially operational at the end of 1997 and fully operational in June 1998. However, treatment and disposal fees are relatively higher than that in Japan, and charges for scheduled waste treatment and disposal have a huge impact on the environmental costs of Japanese companies. Moreover, over the past year or more since the Kualiti Alam plant was commissioned, most Japanese companies have gathered up their many years' worth of accumulated scheduled wastes and sent them to the disposal plant, having to pay treatment and disposal fees amounting to millions of yen in many cases.

Even today, Malaysia still has only one officially approved disposal facility where scheduled wastes can be treated and disposed of in accordance with the laws and regulations. Also, there is no competition in the industry because the Malaysian government granted Kualiti Alam an exclusive right, effective for 15 years from 1995, to conduct scheduled waste treatment and disposal operations nationally (in Peninsular Malaysia). Japanese companies have pursued negotiations about the expensive charges through the Japanese Chamber of Trade and Industry in Malaysia (JACTIM) and other organizations, and present prices are about 10 % lower than the original schedule of fees. DOE officials also acknowledge that the fees are high, and are reportedly conducting research on international comparisons and the economics relating to treatment and disposal fees.

At present, however, Japanese companies are obliged to rely on the monopoly company, Kualiti Alam, for scheduled waste treatment in accordance with the law. They will need to bear a continuing cost burden, greater than borne in Japan, for the foreseeable future. Consequently, some companies in this survey had installed dryers for drying treated wastewater sludge in order to reduce the weight of solid wastes, or were trying various ways of reducing the amount of waste generated in the factory.
Other than scheduled wastes, industrial wastes that have some market value in Malaysia are mostly collected by private recycling contractors. To this end, Japanese companies generally have stockyards in the factory so that wastes can be properly separated and sorted. They are also trying to reuse and recycle the different types of waste with a view to reducing waste volumes.

(3) Pollution controls based on compliance with strict effluent standards

Along with the question of scheduled wastes, meeting the requirements of Malaysia's strict effluent standards is central to the pollution controls of Japanese companies. Most of the general parameters in Malaysia's effluent standards, such as BOD and COD, are stricter than in Japan, and there are some regulated heavy metals, such as nickel, which are absent from the Japanese standards. In addition, Malaysia's standards apply not only to industrial effluent but also to household wastewater. This means that Japanese companies, which typically have relatively large factories that may employ several hundred or up to a thousand workers or more, cannot neglect the treatment of domestic and human wastewater.

Also, although most Japanese companies are located in industrial estates, industrial estates in Malaysia, unlike other Southeast Asian countries, do not have central wastewater treatment facilities. Further, the simple administrative system of cumulative fines or "compounds" for offenses against environmental regulations relating to air pollution or industrial wastes, for example, do not apply to violations of the effluent standards, and offenders are promptly charged and prosecuted. For this reason too, Japanese companies cannot afford to be lax in treating their wastewater.

To comply with the effluent standards, all the Japanese companies we surveyed had needed to tackle advanced wastewater treatment themselves, and had invested large amounts of money in building treatment systems with extra facilities that add to running costs, such as sand filtration and activated carbon adsorption systems. As well as installing treatment equipment, the companies are also paying close attention on a daily basis to the proper management of factory operations and to water quality monitoring, for example. Some of the companies we visited were aiming at an even higher level of wastewater treatment, based on self-imposed effluent standards even more stringent than the regulatory limits.

Although Malaysia does not yet regulate groundwater contamination, a number of Japanese companies were regularly monitoring the groundwater in areas surrounding their factories, and taking other preemptive measures to avoid groundwater contamination by heavy metals or organochlorine compounds such as trichloroethylene.

In regard to other forms of pollution, such as air pollution, for example, there were no factories with desulfurizing units or other large-scale air pollution control equipment since most of the companies visited for this survey were manufacturing industries involved mainly in machinery assembly, industries that contribute little to the air pollution load. However, all the companies were trying in various ways to prevent discharge of pollutants or particulate matter from factory buildings, by installing scrubbers or other pollution control equipment at air vents and outlets, or by using fuels with a low air pollution load for boilers and other fuel-burning equipment.

Another dominant trend, particularly in the electronics industry, is the move to substantially eliminate lead from manufacturing processes and products, in response to regulatory trends in Europe and in order to improve the working environment. The ultimate aim is to shift to lead-free solder and to phase out lead completely.
As a developing country, Malaysia is still permitted to use CFCs controlled under the Montreal Protocol. However, the government is aiming at early reduction of ozone depleting substances and has brought forward its CFC reduction program to coincide with the Protocol's control schedule for advanced nations. Most Japanese companies have already ceased using CFCs.

2. Corporate Sharing of Environmental Information and Contribution to Malaysia's Environmental Programs

The sharing of environmental information by initiating contacts across corporate boundaries is an evident trend among Japanese companies in Malaysia.

Many of these companies belong to the Japanese Chamber of Trade and Industry in Malaysia (JACTIM), whose Management Committee oversees environmental matters and plays a major role in making environmental information available to members. In 1995, JACTIM published a "Handbook on Environmental Law in Malaysia," which summarizes the regulations on scheduled wastes and other environmental legislation. As well as helping to distribute environmental information to Japanese companies, JACTIM also lobbies the relevant government departments and agencies to press for lower fees for the treatment and disposal of scheduled wastes.

In addition to JACTIM-initiated activities, some of the corporate groups operating in Malaysia have joined forces to gather information about obtaining ISO 14001 certification. Some large group

companies are exchanging environmental information outside of their own organization, by holding meetings with the presidents of other Japanese companies located in a particular industrial estate.

The Malaysian government recommends that industries build environmental management systems and obtain ISO 14001 certification. As the accrediting organization, the Standard and Industrial Research Institute of Malaysia (SIRIM), a federal enterprise with private-sector involvement, supports industries wishing to obtain ISO 14001 certification. The first company certified in Malaysia was a Japanese company which achieved certification by working jointly with SIRIM, and subsequently helped to build a support framework in Malaysia for obtaining ISO 14001 certification. In addition, some Japanese companies are taking part in a staff exchange program involving private-sector industry and the DOE, and are making the innovative environmental information held by their own companies available to other program participants.

Japanese companies are also contributing to human resource development in the Malaysia's environmental sector. In many Japanese companies, a Malaysian staff member is responsible for environmental matters. In fact, there have been cases where a Malaysian, having learned a variety of environmental techniques at a Japanese company long established in Malaysia, later takes charge of the environmental management system in a different Japanese company, or works on promoting pollution controls in a local company. Although this raises difficult questions about companies losing personnel that they have trained themselves to another company, viewed from a broad perspective, staff mobility helps to raise the whole level of environmental practices in Malaysia.

One company in Malaysia is the local subsidiary of a leading water treatment manufacturer in Japan. This company undertakes the design, construction, control, and water quality monitoring of water treatment facilities for Japanese companies in Malaysia, and provides them with a variety of environment-related information.

3. Regrettable Pollution Episodes and the Need for Better Communication with Environmental Authorities

In 1985, local residents fought a legal battle to shut down Asian Rare Earth, a joint venture chemical company in Malaysia in which a Japanese company held a 35 % stake. The company was accused of having mismanaged its radioactive waste and of causing health damage in the plant vicinity. The incident was widely reported at the time, both in Malaysia and in Japan, as a case of "pollution export" by Japan. Although the company won the initial court case, it ultimately had to close the plant in 1994. The incident remains an unavoidable topic in any discussion of the environmental practices of Japanese companies in Malaysia, and it is well remembered by companies that have been longest in the country.

Partly because of this incident, most Japanese companies operating in Malaysia have incorporated environmental measures as part of their normal business activities, and are pursuing sound practices in regard to pollution control, as discussed above.

Unfortunately, however, during the course of this survey, a Japanese company was prosecuted for a pollution offense, and the incident was widely reported in Malaysian newspapers. It involved a Japanese metal finishing reagents dealer, which, in May 1999, illegally dumped scheduled wastes containing heavy metals within its premises. The court ruling passed down in October 1999 imposed a fine of 100,000 ringgit and the company was ordered to transport all of the waste to Kualiti Alam and to treat and dispose of the waste in accordance with the law.

Referring to this episode, the Director General of the DOE, Rosnani Ibrahim, whom we visited in the course of the survey, commented that some Japanese companies in Malaysia, in endeavoring to obtain ISO 14001 certification, for instance, are performing well above the level required by the DOE. "We're very happy with the environmental practices of Japanese companies. The present incident is a regrettable exception," Rosnani said. Since the incident was exposed in July 1999, it has been

publicized on a grand scale in the English newspaper published by Malaysia's governing party, the United Malays National Organization (UMNO). The episode has served as ammunition in the government's campaign to promote its scheduled waste policies by imposing punitive damages as a warning to potential offenders. But that does not alter the fact that the violation occurred.

There have been subsequent violations too. During the survey we visited the DOE branch office that has jurisdiction over Selangor, the state next to Kuala Lumpur where the majority of Japanese companies have their factories. We were told that several of the pollution offenses in 1999 were committed by Japanese companies. Of the 99 prosecutions resulting in fines, four cases involved Japanese companies. Three of those cases were violations of the effluent standards, and the other was related to scheduled wastes. Of the 80 cases in which companies were ordered to pay compounds, five involved Japanese companies. Further, we were told that environmental offenses by foreign companies other than Japanese companies apparently occur at about the same frequency as by Japanese companies, particularly among small and midsize companies. In reality, most offenses occur at the hands of small and medium-size local Malaysian companies. But in fact, offenses by Japanese companies are being prosecuted, and Japanese companies are expected to make a greater effort in environmental matters.

The Director of the DOE State Office in Selangor made some worrying statements in the course of discussions about the problem. He said firstly that Japanese companies rely too much on their Malaysian managers to carry out routine environmental practices, and suggested that Japanese top executives "fail to grasp the real situation." He said also that although the Selangor State Office would like to exchange information and opinions about factory environmental regulations with Japanese management, it is difficult to find the opportunity. "If there were such opportunities, there would be room for negotiation before things got as far as a court case," he said.

Since we were unable to visit any DOE State Offices elsewhere in the country during this survey, it would not be fair to say that the Selangor DOE Director's statements represent the general opinion in Malaysia, but his words certainly cannot be ignored. In the future, while continuing to put environmental practices firmly in place, Japanese companies should also be working toward much closer communication between their managerial staff and environmental administrative authorities.

This survey included interviews with Japanese companies in Malaysia about how each company's environmental practices were affected by the Asian currency and economic crisis that occurred in summer 1997. Most Japanese companies in Malaysia are export-oriented, and although some companies said that the crisis had economic repercussions such as falling sales, they all agreed that the crisis had no effect on corporate environmental practices. With the package of capital and foreign exchange policies introduced in September 1998, Malaysia fixed the ringgit currency at 3.8 to the U.S. dollar, but this turned out to be a comfortable level. Unlike Indonesia and other Southeast Asian countries, the currency and economic crisis does not appear to have had much effect on the environmental practices of Japanese companies in Malaysia.

Section 2
Cases of Meeting Strict Effluent Standards

Sections 2 to 4 summarize the findings in their environmental measures by the visits at the subject companies and interviews with of their persons in charge. The report contains information on such items as discharges of pollutants and their concentrations in the effluent and emission to the extent the interviewees disclosed. In Malaysia, public wastewater treatment plants are insufficiently provided. Therefore, wastewater is discharged directly from plants and factories to such public waters as rivers. For this reason the Malaysian government imposes strict effluent standards on each industry. The standards are stricter on most items than the nationwide standards of Japan. The Malaysian government applies the same strict standards to the household wastewater. This section presents cases in which the Japanese companies in Malaysia generally adopt highly advanced facilities, technologies and precise operations to cope with such strict effluent standards. These companies have established company standards much stricter than those imposed by the government. They may be regarded as quite positive and innovative in their attitude toward the issues of environmental conservation.

Case 1 Example of a Plant Executing Comprehensive Wastewater Treatment to Neutralize Poisonous Hexavalent Chromium

1) Outline of the Company

Company A
Business line: Manufacture of the components of shock absorbers and power steering of automobiles and motored bicycles
Number of employees: 378
Start of operation: 1985
Location of the plant: Industrial Estate in Selangor State about 25 km to the southwest of Kuala Lumpur
Japanese equity ratio: 100%

2) Background

Company A has opted to establish the plant in this industrial estate because of the location of this industrial estate being close to a port facility which would provide convenience in transportation of the products and procurement of labor, for example. The industrial estate was developed by the government of the State of Selangor. The industrial estate does not have a central wastewater treatment plant; therefore, all the tenant companies are required to treat their wastewater clean enough to satisfy the wastewater effluent standards before they discharge their wastewater to outside of the estate. The plant has a facility for chromium plating which produces wastewater containing hexavalent chromium ion (Cr^{6+}). The standard for hexavalent chromium imposed by the Malaysian government is much stricter than their Japanese government counterpart. The company established a complete wastewater treatment plant and has operated the plant minutely to satisfy the chromium standard.

3) Measures Taken by the Company

a. Wastewater Treatment

The plant generates a coolant wastewater stream containing cutting oil, a paint wastewater stream containing paints and a wastewater stream containing zinc phosphate, in addition to the chrome wastewater stream from the chromium plating. The wastewater must satisfy all items for the Standard B of effluent standards set by the Malaysian government before the wastewater can be discharged to the public waters. Actually, however, the company needs to report the compliance with the standards shown in Figure 2-2-1 to the Department of Environment (DOE), in view of the chemical substances the company handles.

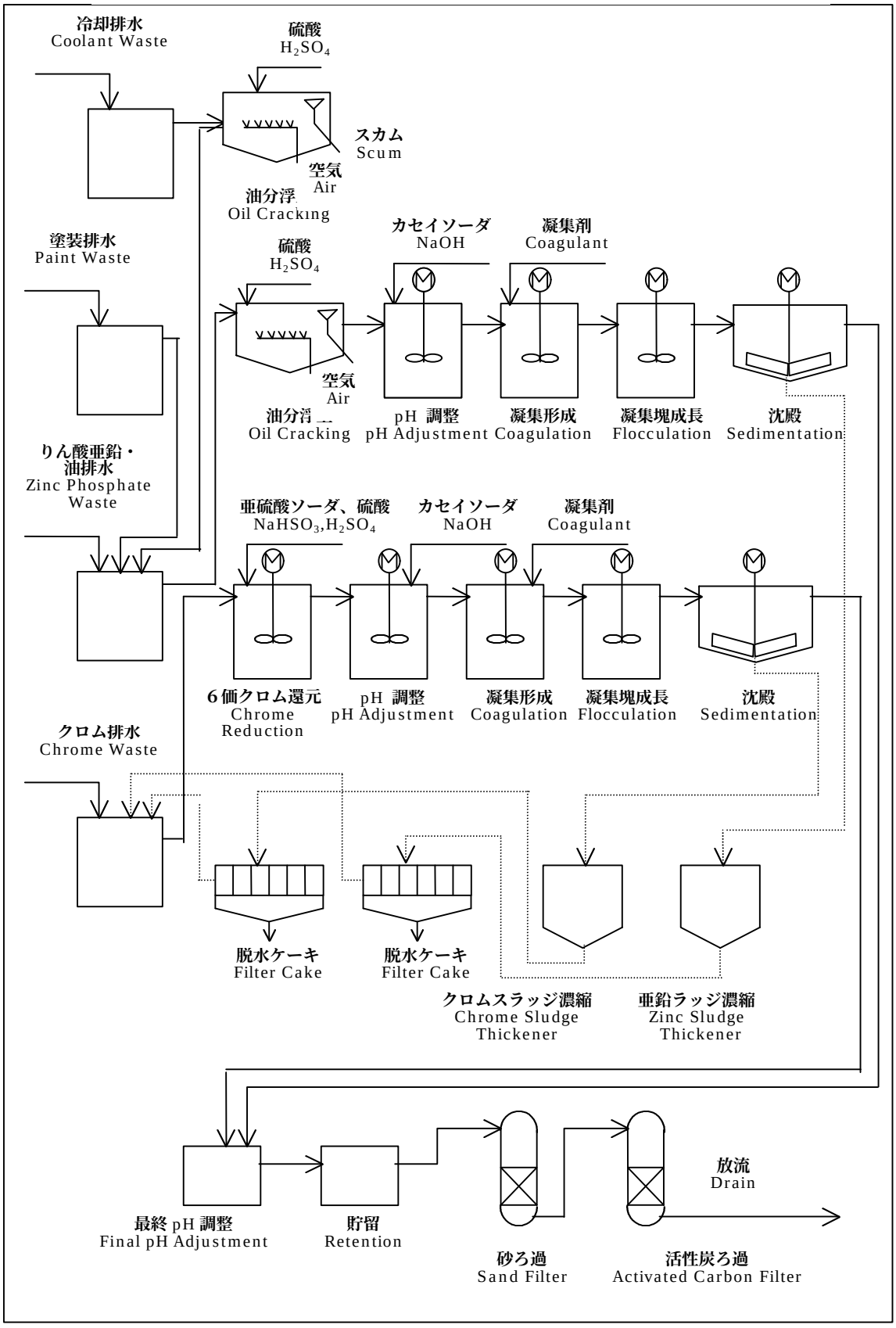
Figure 2-2-1 Effluent Standards for Company A (Unit: mg/liter)

Item	pH	COD	BOD	SS	Oil	Cr^{3+}	Cr^{6+}	Fe	Zn
Standard	5.5-9.0	100	50	100	10.0	1.0	0.05	5.0	1.0

The standard for hexavalent chromium, 0.05mg/liter maximum, is one-tenth as strict as the Japanese government standard for nationwide application, or 0.5mg/liter maximum. Hexavalent chromium ion is not amenable to neutralization followed by sedimentation applicable to removal of most other heavy metals. Hexavalent chromium ion must first be reduced into trivalent chromium ion under strict control of the pH value of the solution and oxidation-reduction potential, before it is made amenable to neutralization followed by coagulation sedimentation. A small mistake in pH control and oxidation-reduction potential could increase hexavalent chromium concentration over the standard, or 0.05mg/liter.

The company constructed a wastewater treatment plant consisting of the facilities shown in Figure 2-2-2 in 1994 to satisfy all items of the standards. The coolant wastewater is first treated by dissolved air flotation to remove oil by flotation. Thereafter, the coolant wastewater, the paint wastewater and zinc phosphate wastewater are mixed. The mixed wastewater is subjected to dissolved air flotation to complete oil removal, followed by addition of caustic soda to sediment heavy metals in the form of hydroxides. Then, a coagulant is added to the water to settle the suspended materials to the bottom for removal. The sedimentation tank allows the content to be separated into clear supernatant water and sludge containing heavy metals. The supernatant clear water is sent to the final pH adjustment tank.

Figure 2-2-2 Flow of the Wastewater Treatment of Company A



The chrome wastewater is made acidic, to the pH value of around 2, by addition of sulfuric acid and sodium sulfite. The hexavalent chromium is reduced to trivalent chromium under such a condition. During this time oxidation-reduction potential is maintained between 250 and 300 mv by adjustment of addition of sodium sulfite. Then, sodium hydroxide is added to make the solution alkaline to sediment chromium in the form of trivalent chromium hydroxide. The trivalent chromium hydroxide is made to coagulate and settle by addition of a coagulant. The treated clear supernatant water is sent to the final pH adjustment tank to be mixed with the above-mentioned supernatant clear water. The combined clear supernatant water is discharged to public waters after being sand filtered and treated with activated carbon bed. The purpose of sand filtering is to remove fine suspended matter, which has escaped the upstream sedimentation process. The purpose of the use of activated carbon is to adsorb and to remove organic compounds which could increase COD and BOD.

In the treatment of hexavalent chromium, control of the addition of sodium sulfite is very important. The addition of sodium sulfate should neither be too much nor too small in order to keep the hexavalent chromium concentration less than 0.05mg/liter. Engineers who have majored in environmental science in university are exclusively responsible for the operation of this system. This system requires a team of two persons for the operation, and it's in operation for 24 hours a day. The plant laboratory measures pH, COD and hexavalent chromium concentration every day to confirm satisfactory operation of the wastewater treatment plant. If abnormality is found in the analysis of the treated water, corrective measures are immediately taken. Figure 2-2-3 shows an analysis of the treated water.

Figure 2-2-3 Analysis of Treated Wastewater of Company A

Item	Standards	Date				
		August 9	August 10	August 11	August 12	August 13
pH	5.5-9.0	6.78	6.90	7.13	6.75	6.98
COD	100 mg/liter	41	24	75	40	37
Cr^{6+}	0.05 mg/liter	0.01	0.02	0.01	0.01	0.02

The effluent water satisfies every item of the standards shown. It is worth noting that hexavalent chromium concentrations are lower than the standards by large margins.

Analysis of the treated water is compiled by the week and the result is submitted to the Manager of the Department through the immediate supervisor and the section manager. The Manager of the Department and concerned Malaysian managers jointly check the result of analysis. They put down their comments on the report and return the report to the analysts. Such a system of feeding back the results to the persons in charge helps bring together the Malaysian workers in the combat against the environmental problems surrounding the company.

b. Solid Waste Treatment

The scheduled wastes for which methods of treatment and disposal are strictly controlled by the government include wastewater treatment sludge, wastewater from metal cutting process, and trichloroethylene. Production of these wastes amounts to about eight tons a month. Presently, these wastes are consigned to Kualiti Alam, an official disposal agent of Malaysia. The treatment and disposal fee is 27,000 yen/ton. Formerly, Company A was obliged to stock them in the premises of the company. Therefore, the company had a huge pile of drums containing these scheduled wastes.

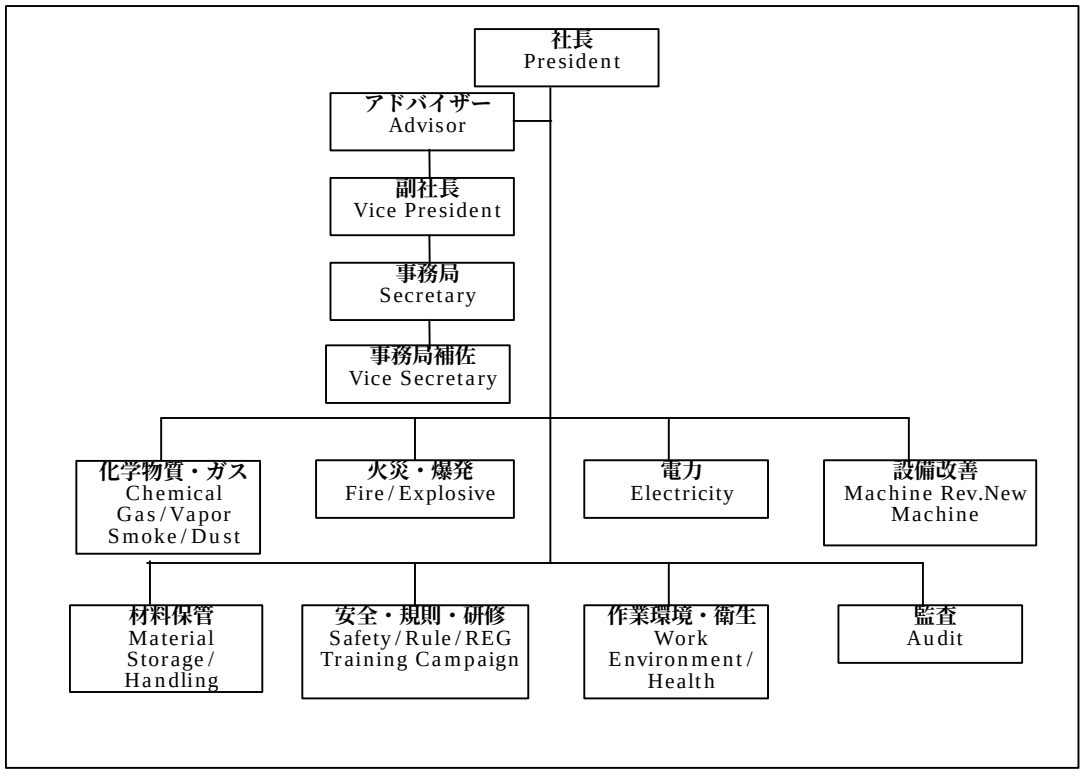
The stock reached 1990 drums, or 547 tons, in 1998. It was found that the treatment would have cost the company 15 million yen if these would had been consigned to Kualiti Alam. The company then opted to introduce a dryer. The drying operation successfully reduced the weight of the waste to one-third the original weight. The disposal cost of the waste was saved accordingly.

c. Establishment of the Environmental Management System

Figure 2-2-4 shows Safety, Health and Environment Organization of the company. This organization consists only of Malaysian managers except for the chief operating officer, or the president of the company. There are eight field branches covering various natures of the company's operation, take Chemical Gas/Vapor Smoke/Dust, for example. Representatives of the workplaces concerning these eight operations participate in the field branch activities. This Safety, Health and Environment Organization is the central one preparing for acquisition of the ISO14001 certification.

The Japanese parent company sends a director in charge, together with a couple of assistants, to Company A once or two times a year to conduct two-day environmental auditing. The auditing covers 20 items including whether environmental policy, plan and organization are well organized, whether wastewater is adequately treated, whether items previous pointed out have been duly taken care of. When this auditing started in 1994, Company A's overall rank was C with 19 items pointed out. The performance improved every year. The company's overall rank was A in 1998.

Figure 2-2-4 Safety, Health and Environment Organization of Company A



Case 2 Measures Equivalent to Those in Japan Are Taken to Meet Future Effluent Control

1) Outline of the Company

Company B
Business Line: Manufacturing of air conditioners
Number of employees: 1,000
Start of operation: 1990
Location of the plant: Industrial Estate in Selangor State 30 km to the south of Kuala Lumpur
Japanese equity ratio: 100%

2) Background

The products of the group companies, of which Company B is part, are consumer products used by general consumers. Business of the group companies is globally spreading in marketing their products and in having production plants. With increasing awareness of environmental issues throughout the world, Company B needs to improve its corporate image as a company giving due environmental consideration. Japanese parent company of Company B has an environmental performance principle consisting of nine clauses, including the following two clauses, oriented towards overseas operation; namely,

- Company's overseas operations and product exports should always consider their impacts upon the local environment and should endeavor to respond rightly to the needs of the local communities, and to take necessary countermeasures.
- In addition to observing environmental standards of the international communities, nations and local governments, the company should set up its own standards as found necessary to conserve environment.

The metal surface treatment process of the plant produces wastewater effluents containing metallic ions, paint debris and alkalis. Its degreasing process used to employ trichloroethylene and therefore its diffusion into wastewater and ground water has been carefully watched. The discharge point of its effluent water is located upstream of the intake point of the drinking water; therefore, the Standard A, the very strict standards, are applied to the plant. The plant naturally has to exercise right control on its wastewater. Although Malaysia does not have a regulation on trichloroethylene in underground water, the company has decided to monitor trichloroethylene contamination of underground water by trichloroethylene as is done in Japan.

3) Measures Taken by the Company

a. Wastewater Treatment

Figure 2-2-5 shows the schedule of wastewater control of Company B. Electric conductivity, turbidity and pH were measured by the plant laboratory staff on the samples taken everyday on 10:00 a.m. and 3:00 p.m. at nine sampling points. These three items can be easily measured on the spot by portable instruments, the data on these items are very effective in diagnosing the operating conditions of the wastewater treatment plant. The sampling points have been laid out along the movement of the wastewater in the treatment plant from the wastewater receiver to the sewer outside the plant downstream of the discharge point. The measurement of these three items enables Company B to take immediate corrective measures. Thus, the plant may be able to prevent the discharge of wastewater which fails to satisfy the standards.

The treated wastewater is analyzed for 16 items once a week. The sample is taken at the discharge point and is analyzed in the plant laboratory. The treated water is also analyzed for all the 22 items once a month by a registered testing company not associated with the company. So far, the wastewater of the company has satisfied the level of all these items. The results of these analyses are compiled and submitted to the Department of Environment (DOE) once a month.

Figure 2-2-6 shows the flow of the wastewater treatment facilities. The plant separately treats two types of wastewater: the highly contaminated wastewater that is periodically produced, and not highly contaminated wastewater that is regularly produced. Those types of wastewater containing metallic ions are reacted with caustic soda to convert these metallic ions into coagulates of water-insoluble hydroxides to facilitate their sedimentation. These particles of hydroxides are made to form large flocs by the combined actions of poly aluminum chloride (PAC) and a high-polymer coagulant. The flocs are allowed to settle in the settling basins. The downstream process beginning with neutralization consists of one process train where the clear supernatant effluents of the upstream meet and are treated together. The treatment consists of a biological treatment in the aeration tank where organic substances are decomposed and removed. The clear supernatant separated from the sludge in the sedimentation tank is sand filtered followed by activated carbon treatment for removal of remaining organic compounds before discharge.

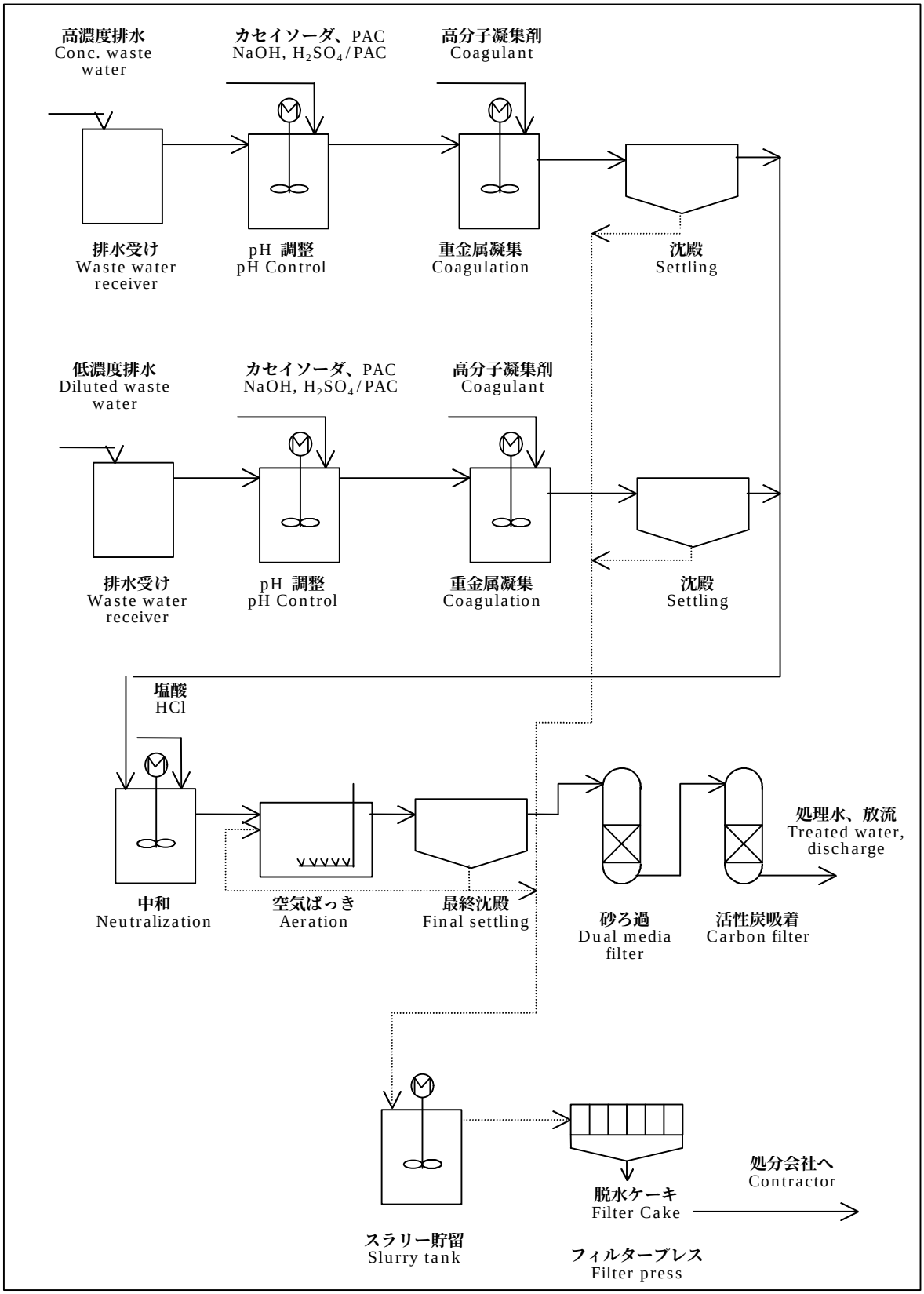
Figure 2-2-5 Items and Frequency of Analysis

Item	A Standards	Analysis frequency, sampling points, place of analysis		
		2 times/day 9 points Plant laboratory	Once/week 2 points Plant laboratory	Once/month 5 points Registered testing companies
Electric conductivity	-	X		
Turbidity	-	X		
pH	6.0 - 9.0	X	X	X
COD	50		X	X
BOD	20			X
Arsenic/As	0.05			X
Boron/B	1.0		X	X
Total suspended solids/TSS	50		X	X
Cadmium/Cd	0.01		X	X
Trivalent chromium/Cr^{3+}	0.20			X
Hexavalent chromium/Cr^{6+}	0.05			X
Copper/Cu	0.20		X	X
Lead/Pb	0.10		X	X
Iron/Fe	1.0		X	X
Manganese/Mn	0.20		X	X
Nickel/Ni	0.20		X	X
Mercury/Hg	0.005			X
Tin/ Sn	0.20			X
Zinc/Zn	1.0		X	X
Free Chlorine/Cl	1.0		X	X
Cyanides/CN	0.05		X	X
Sulfides/S^{2-}	0.5		X	X
Phenols	0.001			X
Oil & grease	ND		X	X
Phosphate/PO_4^{2-}	-		X	

b. Monitoring of Underground Water

The Malaysian government has not put restrictions on the use of trichloroethylene. Nevertheless, Company B has voluntarily discontinued using this solvent since 1996 and converted the degreasing process into one used in Japan. The company has since monitored underground water trying not to overlook possible contamination by trichloroethylene.

Figure 2-2-6 Flow of the Wastewater Treatment of Company B



A vertical well has been drilled for sampling underground water at one of the corners of the plant premises. The location of the well was identified at the time of geological survey done for the plant construction as the furthest downstream of the underground water flow. If trichloroethylene had ever leaked in the plant premises, the trichloroethylene would pass this place before leaving the plant premises. The company has set its own standard at 0.03 mg/liter, equivalent to the Japanese standard, and has checked water for trichloroethylene once in every six months. Trichloroethylene has never been detected since start of the monitoring.

c. Solid Waste Treatment

The wastewater treatment plant produces sludge. To reduce production of sludge in the treatment process, the plant has replaced ferric chloride with a polymer coagulant for a coagulant. Thus, production of sludge has been reduced from 18 tons/month to 5.9 tons/month. The company plans to introduce a dryer to further reduce the production of sludge. The company consigns once in two to three months disposal of the sludge to Kualiti Alam, the only authorized waste treatment and disposal agent in Malaysia. The fee for disposal by Kualiti Alam depends upon organic carbon content of the sludge. The sludge containing organic carbon at 10 % or less is landfilled while that containing more than 10% is incinerated. The fee for landfilling is 495 RM/ton (or about 15,000 yen/ton) but that for incineration is much higher at 2,700 RM/ton (or about 81,000 yen/ton). Kualiti Alam plans to lower in a stepwise fashion the criterion for incineration down to 3% of organic carbon. This could result in increase of disposal cost. Although transportation of the sludge to Kualiti Alam is consigned to a registered contractor, the company traces its sludge to see that the sludge has been duly delivered to Kualiti Alam.

Until 1997 when Kualiti Alam started treating and disposing of the sludge, the plant was obliged to keep the sludge on the premises of the plant.

d. Others

The waste from Company B includes copper and aluminum pipes. These are now sold to dealers for recycling. The company endeavors to increase the number of items to be recycled. The number of items recycled was 16 in 1996. This has increased to 25 by 1998 including reuse of printed circuit boards. The company also has been trying to reduce electricity consumption, with the target set for the year 2000 at 3 % reduction from the consumption of 1997.

Wastewater streams from each plant in the industrial estate gather at a pond before the water is discharged to a river. The quality of effluent water is voluntarily checked once in every six month and the results of analysis are reported to a meeting of the presidents of the tenant companies in the industrial estate. It has been agreed that when the quality of the effluent water is found contaminated at an alarming level, the tenant companies should jointly take necessary corrective measures. Such a situation has never occurred so far.

To prevent the noise arising in the industrial estate from annoying the people in the surroundings, 13 monitoring stations have been installed at the peripheries of the industrial estate. Although the national standards for noise have not been set in Malaysia, voluntary standards, 65dB in the daytime and 50 dB at night, have been set for noise control. Once it was found necessary to reduce the noise level of an exhaust fan. This was resolved by providing measures to hold down noise from the duct. No noise problem has occurred since then. Today, noise monitoring within the industrial estate is routinely done after the monthly environmental committee meetings.

The positive attitude of the company toward environmental conservation reflects itself in acquisition of the ISO14001 certification in 1997 and also in the award for best environmental conservation in the State of Selangor for 1998. In 1994 Company B was awarded by the Ministry of Energy, Communications and Multimedia the Energy Efficiency Award for installation of electric power measurement system and activities to enhance awareness of the employees for the importance of energy conservation.

Case 3 Example of Controlling Heavy Metals in the Wastewater Based on its Own Strict Standards

1) Outline of the Company

Company C
Business line: Manufacture and sale of transistors and linear ICs
Number of employees: 1,700
Start of operation: 1976
Location of the plant: Industrial Estate in Selangor State 20 km to the south of Kuala Lumpur
Japanese equity ratio: 70%

2) Background

The brand name of Company C's products is internationally well known. The products of this plant are exported to South and East Asian Countries including Japan. With the rising awareness of environmental conservation, the users of the products are demanding increasing environmental consideration in the manufacturing processes of the company.

The effluent standards for waste waster are stricter than those of the government of Japan in many of the items. The manufacturing process produces wastewater containing heavy metals; therefore, the wastewater has to be treated to satisfy the strict standards for heavy metals. In order to be certain that the treated water meets the standards, the company has voluntarily set up its own standards which are even stricter than the government standards.

3) Measures Taken by the Company

a. Wastewater Treatment

The process of washing after soldering, the laboratory for chemical analysis, and the cleaning of jig and tools produce wastewater containing heavy metals. Figure 2-2-7 shows both the government standards imposed on Company C and Company C's own standards. Its own standards have been set at 70 % of the government standards.

Figure 2-2-7 Government and Own Effluent Standards of Company C

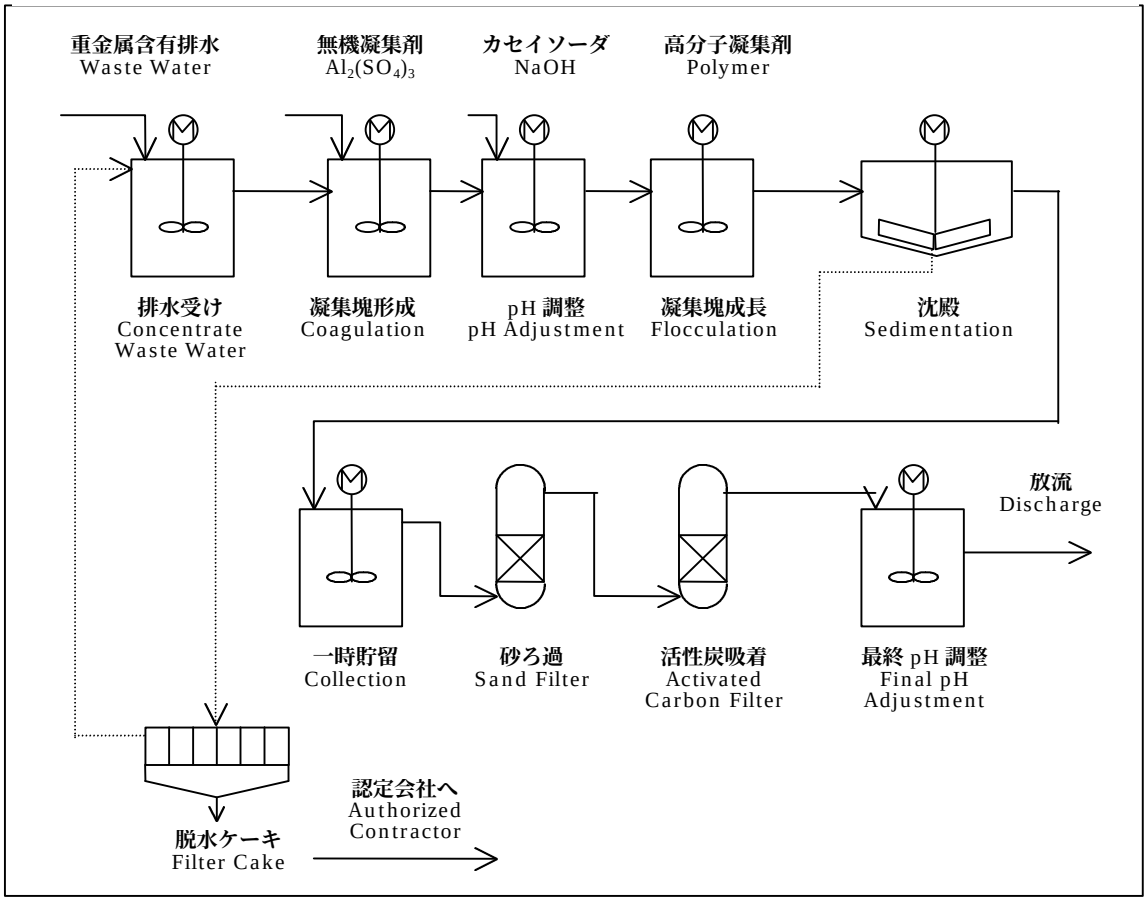
(Unit: mg/liter)

Items	pH	BOD	COD	SS	Pb	Cu	Ni	Sn	Zn	B	Fe
Government standards	5.5-9.0	50	100	100	0.5	1.0	1.0	1.0	1.0	4.0	5.0
Company's standards	6.0-8.0	35	70	70	0.35	0.7	0.7	0.7	0.7	2.8	3.5

Ni (nickel), Sn (tin) and B (Boron) are not specified in the Japanese effluent standards. The values of the standards except for pH and Pb (lead) are stricter than their Japanese counterparts. The value for Zn (zinc) for Company's standard, 0.7mg/liter, is particularly strict compared with the Japanese standard of 5 mg/liter, or one-seventh of the Japanese standard. Zinc is an amphoteric metal, soluble in both acidic and strong alkaline solutions. Accordingly, pH of the wastewater must be controlled in a very narrow range in order to reduce zinc concentration in water to this level by removing zinc as a water-insoluble hydroxide.

A wastewater treatment plant as shown in Figure 2-2-8 was constructed in 1983 to meet these standards. To the wastewater containing heavy metals is added aluminum sulfate as a coagulant to flocculate heavy metals. A high-polymer coagulant is then added to the wastewater to form large and stable flocs. The wastewater is separated into clear supernatant water and settling sediment in the sedimentation basin. The supernatant water is sand filtered to remove heavy metal particles that still remains after the upstream treatment, followed by treatment by activated carbon to remove by adsorption organic substances to make the effluent satisfy the COD standard. The treated wastewater is finally checked for pH before being discharged to the public waters. The discharged water is analyzed by the company's laboratory once a

Figure 2-2-8 Flow of the Wastewater Treatment of Company C



week to confirm that the quality satisfies the standards. Every month, the company let a non-affiliated registered testing company analyze the effluent water. Once in every three month, the company reports to the Department of Environment (DOE) the results of the analysis by the registered testing company. Presently, the treated water satisfies every item of the company's own standards to indicate that the wastewater treatment plant operates quite satisfactorily. The sludge separated from the sedimentation basin is dehydrated into filter cake to be delivered to an authorized disposal company for treatment and disposal.

b. Exhaust Gas Treatment

Contaminated exhaust gas generated at this plant are a fume of lead and the flux from the soldering process and gas generated at the laboratory. The standards shown in Figure 2-2-9 is set for these gas streams.

Figure 2-2-9 Effluent Gas Standards for Company C

(Unit: mg/Nm^3)

Item	Pb	Zn	Cu	H_2SO_4	HCl
Standards	25	100	100	200	400

The contaminated gas streams are aspirated into the duct from the places of origin. The gas is washed with water in a scrubber where the contaminants move to the water phase. The washed gas is sampled immediately upstream of the discharge point for analysis of contaminants to ensure that the gas meets the standards. The water used for scrubbing is sent to the wastewater treatment plant for normal treatment.

c. Establishment of Environmental Management System

Company C began very early taking measures to prevent its own activities from adversely affecting the environment. Company C established the Environmental Committee as early as in 1988 for specifically studying environmental issues throughout the company. In 1992 the company established the Environment Control Section, solely responsible for environmental issues. The company obtained the certification of ISO14001 in 1998.

The Environmental Committee, after having gone through several changes, now has an organization shown in Figure 2-2-10. The chairman and Vice Chairman are the president and a director of the company, respectively, both being Japanese nationals. The management representative and below are all Malaysian managers. The committee has eight acting groups such as Legal Requirements/Environment Section Group and Chemical Management Group.

The organization of the Environment Control Section is shown in Figure 2-2-11, and the section is conducting environmental activities such as observation of laws and regulations, operation management of the wastewater treatment plant, staged campaigns for enhancement of environmental awareness, activity promotion of ISO14001. The manager of the Environment Control Section took environmental science as his major in University.

The company started in August 1996 preparing for acquiring the ISO14001 Certification. The company began training of personnel in managerial level and started a steering committee for ISO14001 certification acquisition. The company completed necessary documents in January 1997. In September and November of 1997, the company received the preliminary review and provisional review, respectively, by an accredited certifying organization. The company received compliance audit in January and verification audit in March 1998, then it was awarded the certification in April 1998. In February 1999, the company had the first surveillance audit.

Figure 2-2-10 Environment Committee of Company C

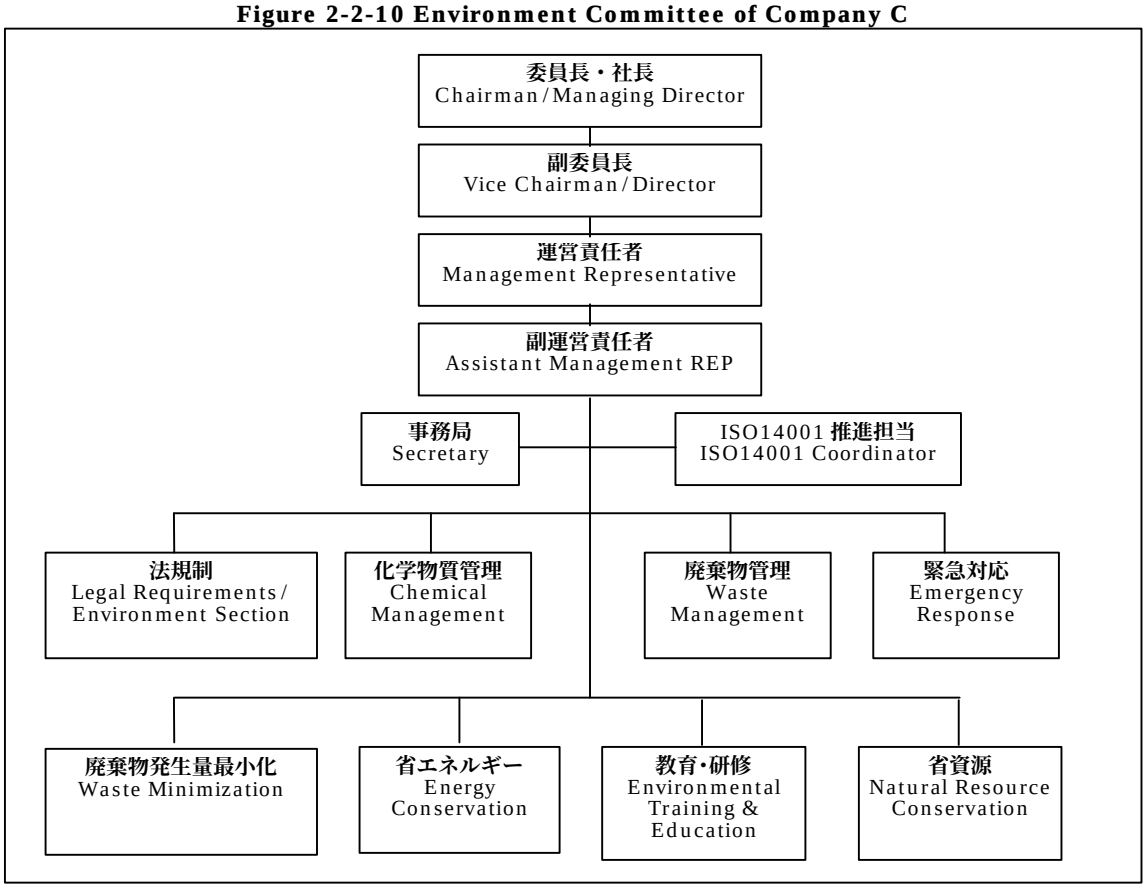
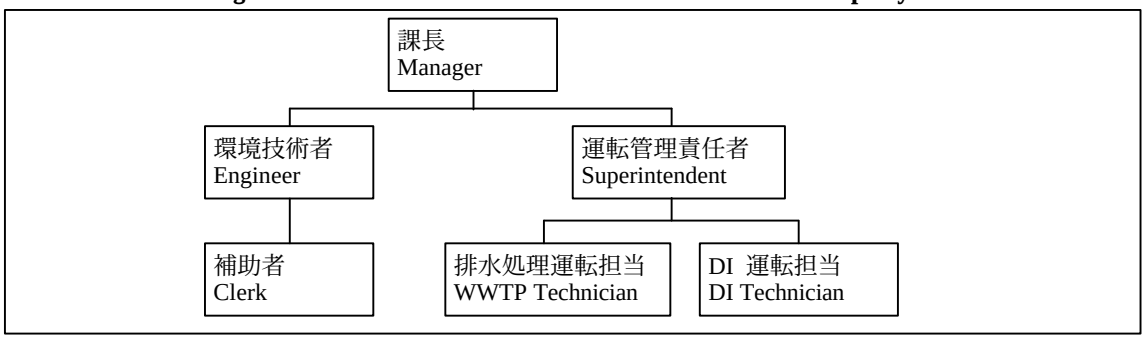


Figure 2-2-11 Environment Control Section of Company C



The following are examples of targets for the company's 1998 ISO14001 activity goals for reduction of environmental loads:

Reduction by 40 % of the use of flux in soldering process,
Reduction of paper consumption by 5 %,
Reduction of electricity consumption for lighting in No. 3 Building by 45 %, and
Termination of the use of CFCs.

The company has successfully achieved all the goals. Now in 1999 the company works hard to reduce electricity consumption in other buildings.

d. Others.

The plant generates about 1.5 tons of scheduled wastes for which methods of treatment and disposal are specified by the government. The sludge from waste treatment is consigned to Kualiti Alam. The recyclable wastes such as spent oil are consigned to the authorized treating companies for reuse or recycling.

As social contribution, the company supported construction of a care facility for people with Down's syndrome. The company first formed the parents' organization for peoples with Down's syndrome and worked for the government for the construction of the care facility. The company provides a financial support to the care facility to cover the managerial and equipment costs. The company also encourages its employees to participate in volunteers' activities for supporting the physically handicapped. The company pays special bonuses to employees with remarkable performances in the volunteers' activities.

Case 4 Example Coping with a Strict Standard for Cyanide Compounds in Wastewater

1) Outline of the Company

Company D
Business line: Surface treatment and metal plating of electric and electronic parts
Number of employees: 80
Start of operation: 1990
Location of the plant: Industrial Estate in Selangor State 20 km to the west of Kuala Lumpur
Japanese equity ratio: 100%

2) Background

A large number of Japan-based electric manufacturers have advanced to Malaysia. Local companies are generally not technically well prepared to provide plating on their products. Therefore, a couple of Malaysian arms of Japanese companies, including Company D, provide metal plating on the products of Japanese companies in Malaysia. To avoid a worst situation in which the company is obliged to stop operation due to poor environmental conservation measures, the company has taken a thorough measure in its environmental measures, wastewater treatment in particular.

The processes of copper plating and nickel plating produce wastewater, containing nickel and cyanide compounds, respectively. The Malaysian standard for cyanide compounds is much stricter than its Japanese counterpart. Besides, there is no standard for nickel in the Japanese government effluent standards. Under such a circumstance, the company was forced to build a highly advanced wastewater treatment plant.

3) Measures Taken by the Company

a. Wastewater Treatment

Figure 2-2-12 shows the effluent standards imposed on Company D. The standards are B Standards, which are considered generally mild; however, its standard for cyanide compounds (CN), 0.1 mg/liter, is as strict as one-tenth the Japanese standard of 1 mg/liter. Its standard for nickel (Ni) is also strict at 1.0 mg/liter.

Figure 2-2-12 Effluent Standard for Company D

(Unit: mg/liter)

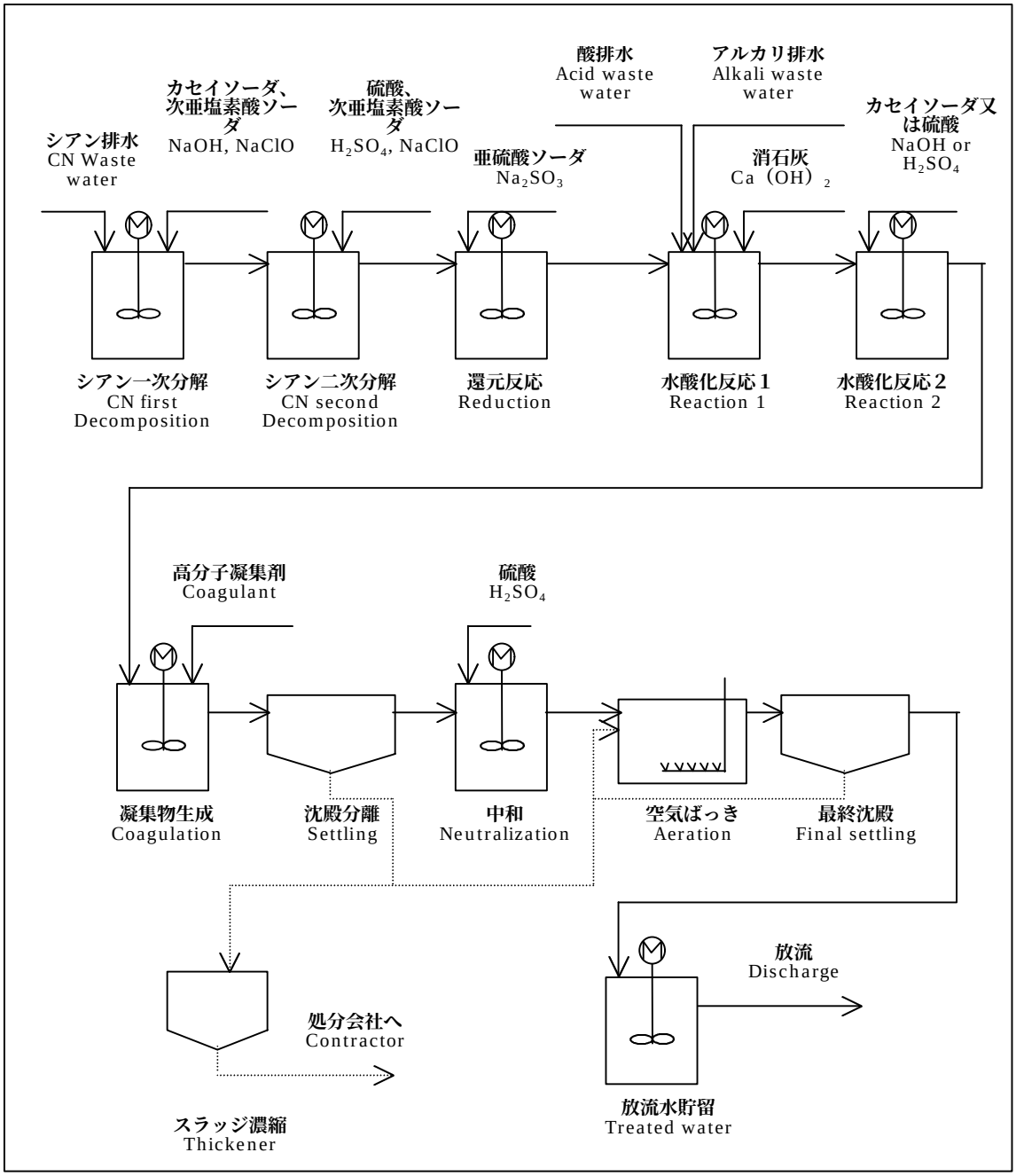
Item	pH	COD	BOD	SS	Cu	Ni	Zn	CN
Standards	5.5 to 9.9	100	50	100	1.0	1.0	1.0	0.1

A wastewater treatment plant shown in Figure 2-2-13 has been constructed to satisfy these standards. The construction was contracted to a Japanese company of reliable technology, although the Japanese company was much costlier.

The CN wastewater is received in the CN First Decomposition Tank where caustic soda is added to bring the pH value to 11. While the pH value is maintained at 11 sodium hypochlorite is added to oxidize and decompose the cyanide compounds. In the CN Second Decomposition Tank sulfuric acid is added to lower the pH value to 7 and sodium hypochlorite is further added to promote oxidation decomposition.

The control of oxidation of cyanide compounds is very difficult and can be dangerous. Either decomposition is insufficient or a deadly poisonous hydrocyanic gas is generated if the solution is made too acidic by addition of an excessive amount of sulfuric acid. The oxidation agent must be added carefully and in the right quantity while monitoring oxidation-reduction potential. After the cyanide compounds have been completely decomposed, the residual sodium hypochlorite is decomposed by addition of sodium sulfite, a reducing agent.

Figure 2-2-13 Flow of the Wastewater Treatment of Company D



For the removal of such heavy metals as iron, nickel and copper, the solution is again made alkaline with the pH value of around 10 by the addition of slaked line, $Ca(OH)_2$, to convert these heavy metals into water-insoluble hydroxides. Then, a polymer coagulant is added to form large flocs out of metal hydroxides to let them sediment in the setting basin. The polymer coagulant is purchased from a Japanese water treating equipment manufacturer.

The clear supernatant water now made free from heavy metals is neutralized to a pH value of about 7 and is subjected to a biological treatment to decompose dissolved organic compounds. The treated water is temporarily stored in a retention tank and is discharged to the public waters after it is confirmed that the

water satisfied the effluent standards.

Nickel hydroxide, unlike hydroxides of other metals, tend to adsorb water-soluble nickel salts. After the hydroxide is settled, the hydroxide gradually releases the adsorbed water-soluble nickel salts in the solution. This unique nature of nickel hydroxide makes it extremely difficult to bring down nickel concentration to lower than the value specified as the standard. To cope with such a tendency of nickel, this plant has two consecutive reactors to complete treatment of nickel.

Company D confirms by it own laboratory testing that the treated water satisfies the standards for pH, cyanide compounds, nickel, COD. Once in a month the company asks two authorized testing company to analyze the treated water and check their results with their own results.

This wastewater treatment is operated by local employees who have done their work right for more than seven years. The Malaysian operators have never caused any problem.

b. Solid Waste Treatment

The two types of sludge, one from the sedimentation of metal oxides and the other from that of the wastewater biological treatment, are concentrated in the thickener. The concentrated sludge transported by registered contractors to the only authorized waste treating and disposal agent, Kualiti Alam, for treatment or disposal. Until Kualiti Alam started operation in 1997, the sludge had been stored in the premises of Company D to the capacity of the plant. The company exported nickel containing sludge to the United States for nickel recovery.

c. Others

The plant has discharged its household wastewater to the sewerage system. The Indah Water Konsortium, IWK, operates the sewerage treating system. IWK used to a government sector entity but now it has been privatized. When IWK was a government sector entity there was no charge for discharge but IWK began charging treating fees upon becoming a private company. At first IWK charged the company the fee based on the amount of running water the plant received. Company D asked for a reduction of the fee corresponding to the wastewater portion that the company discharges to river after treatment to clear effluent standard, then this request was accepted. Presently, sewerage treatment charge from IWK is calculated based on the number of employee at the plant.

Case 5 Example of Managing its Household Wastewater Based on its Own Standards

1) Outline of the Company

Company E
Business line: Manufacture and sale of such electronic parts as tip capacitors and thermisters
Number of employees: 1,650
Start of operation: 1989
Location of the plant: Industrial Estate in Negeri Sembilan State 50 km to the south of Kuala Lumpur
Japanese equity ratio: 100%

2) Background

The Malaysian government has set strict standards upon household wastewater. Very strict standards are imposed particularly when the discharge point to the public waters is located upstream of the intake point of the drinking water. The plant of Company E is located upstream of the intake point of the drinking water and therefore the plant has to observe these strict standards.

The plant is an assembly industry; therefore, its manufacturing processes do not produce wastewater. However, a large number of people working in the plant produce a large quantity of household wastewater. The company has set up its own standards stricter than the government standards so that the government standards may never be exceeded.

The Japanese parent company has declared its environmental charter as enumerated in Figure 2-2-14 and requires its overseas affiliates to behave according to this charter. Clause 2 of the Guideline for Activity sets forth observation of laws and regulations. In line with this guideline, the company has a thorough organization to observe the standards indicated by the Malaysian government.

The electronic parts this plant produces are delivered to assembling plants of electric appliances of Japanese and European capitals in Malaysia.

Figure 2-2-14 Environmental Conservation Charter of the Japanese Parent Company of Company E

Basic Principle
The Company E group declares as its basic principle for environmental conservation activities that everyone in the company recognizes that the global environment nurtures every living thing and joins to act to hand down the favorable environment of the Earth to the next generation.
Basic Policy
The company, in its business activities, opts to choose activities compatible with the recycle-oriented society, with due consideration given to the global environment, of which environmental conservation, energy conservation and resources conservation are key elements.
Guideline for Activity
The Company E group will remain to be a good corporate member of the society. The company will strive to realize its Company Charter by promoting corporate activities while paying sound attention to the global environmental issues and resource preservation. The company determines the Guideline for Activity as set forth below.
Article 1 The company has an organization, with the director in charge as the head, to promote environmental conservation activities. The company ever strengthens this organization and promotes its activities.
Article 2 The company observes law and regulations. At the same time, the company upgrades levels of environmental management.
And Six other articles.

3) Measures Taken by the Company

a. Wastewater Treatment

Figure 2-2-15 shows the standards indicated by the Department of Environment (DOE) to Company E

together with the company's own standards.

Figure 2-2-15 Government and its Own Effluent Standards of Company E

(Unit: mg/liter)

Items	BOD	COD	SS	Oil and grease
DOE's standards	20	50	50	N.D.
Company's own standards	15	40	40	N.D.

The standard indicated by DOE are A Standards applicable to effluent water located upstream of a drinking water intake point. The A Standard has 23 items and the effluent water has to normally satisfy all 23 items. However, since this plant does not discharge heavy metals and hazardous substances, the company has only to satisfy the above four items. The above standards for household wastes are no less severe than those of Japan, North America and Europe and can only be met with highly advanced treating facilities operated under strict controls.

The company has set its own standards more stringent than the official ones in order to be sure to meet the official standards. The plant takes corrective actions immediately when the BOD value is found to exceed the standard value of 15 mg/liter, thus preventing it from exceeding the official standard value.

The company has the effluent water analyzed by a registered testing company once in every two months and reports the results of test to DOE. So far, the wastewater has satisfied all items of the standards.

b. Establishment of Environmental Management System

Company E acquired the ISO14001 certification in April 1998. Since the company has been devoting itself to environmental activities, rightly doing what should be done in the field of environmental conservation has lead to acquisition of the ISO14001 certification. Activities for acquiring the ISO14001 certification helped energy conservation, enhanced yields of products and reduction of production costs as results. The company has well recognized the fact that the investment in preventive environmental measures pays off compared to taking corrective measures after problems have emerged.

In order to let the Environmental Conservation Charter of the parent company work in the plant activities, Company E has established its own Environmental Policy based on the principle of the ISO14001 but more specific suited to the operation of the company. In addition, the Environmental Policy has announced eight articles including energy conservation, resources conservation, promotion of recycling, internal auditing, review of environmental management, contribution to the local community. The Environmental Policy has set forth practical targets, of which the following three items are targeted to be achieved within the three-year period starting from March 1998:

Reduction by 50 % of defective products,
Reduction of electricity consumption by 40 %, and reduction of water consumption by 25 %, and
Increase in the rate of recycling of paper to 40 %.

The company has four committees relating to environmental management activities; namely, the Environmental Management Committee, the 5S (an operation management slogan consisting of five Japanese words which start with "S" in romanized spelling) Committee, the Canteen Committee and Internal Audit Committee. Each of the four branches of the plant has its own environmental management committee, with its own chief. The environmental management committees measure volume of inputs (materials) and outputs (products), thereby controlling production of wastes. The Department of Quality Control and Guarantee works as the secretariat of the activities and coordinates and promotes the total activities. This department is instrumental in promotion of environmental management program. The assigned job of the department includes; improvement of yields and associated reduction of wastes, enhancement of productivity with energy saving, reduction of electricity consumption by right lighting and air conditioning in the plant buildings, reduction of water consumption by right use of water at the canteen, reduction of consumption of paper by more intensive use of e-mails,

and so on. Each branch of the plant announces its own targets and reviews degrees of achievement in every six months.

c. Solid Wastes Treatment

The plant produces the following three kinds of scheduled waste, for which the methods of treatment and disposal are officially specified:

- Ferrite sludge (generated when the raw material ferrite is treated),
- Spent solvent (generated in the soldering process), and
- Spent epoxy resin (generated in the sealing process).

Formerly, these kinds of waste had to be stored in the premises of the plant. The plant had a ten-year stock of drums containing these kinds of waste. Since establishment of Kualiti Alam, the only authorized final treatment and disposal agent, the company has consigned treatment and disposal of the waste to Kualiti Alam.

It is obligatory to report stock of spent solvent to the DOE every month.

d. Exhaust Gas Treatment

The exhaust gas from the soldering process is analyzed for the four items shown in Figure 2-2-16 once a year by a registered testing company. The sample is taken at a point immediately upstream of discharging to atmosphere.

Figure 2-2-16 Exhaust Gas Standard for Company E

Subject substances	Standard (mg/Nm^3)
Acetone	400 (Company's own standard)
Iso-propyl alcohol	405 (Company's own standard)
Rosin	98.0 (Company's own standard)
Lead	25.0 (Government standard)

Of the above standards, the standard for lead is the government standard and other three standards are company's own standards set for voluntary monitoring after Japanese standards.

Section 3
Cases of Establishing an Environmental Management System

The International Organization for Standardization (ISO) issued in September 1996 the ISO14001 standards for environmental management system. The acquisition of the ISO14001 certification means much to indicate that the subject company conducts its business activities with due environmental conservation. Acquisition of the certification should also be advantageous in international businesses. As of the end of 1999, 116 plants or factories in total have acquired the ISO14001 certification in Malaysia. These plants and factories are mostly of Japanese capitals. The first to acquire the ISO14001 certification in Malaysian is a Japanese company. Some of these companies have well established the system of ISO14001 in their companies and scored remarkable accomplishments during the three-year period under the ISO14001 standards. Some Malaysian experts, with experiences gained in the process of acquiring ISO14001 certification in Japanese companies in Malaysia, have moved to other companies where they are playing instrumental roles in acquisition of the ISO14001 certification. This could be considered as a contribution by the companies of Japanese capitals to human resources development of Malaysia.

Case 6 Example of Steadily Growing under the ISO14001 System

1) Outline of the Company

Company F
Business line: Manufacture of main components of television sets
Number of employees: 3,800
Start of operation: 1988
Location of the plant: An industrial estate in Selangor State about 20 km to the south of Kuala Lumpur
Japanese equity ratio: 100%

2) Background

Company F's parent company in Japan has established the basic environmental policy as shown in Figure 2-3-1 that is applicable to its all group companies in overseas. The parent company assists its group companies throughout the world in promoting their environmental activities according to this basic policy. A group company in Singapore plays a role of coordination for business communication from Japan and for information exchange among group companies in Southeast Asia

Company F established the Environmental Protection Committee as early as 1992 and started education for employees on environmental conservation so that every employee could be environmentally conscious. These efforts made the employees easily respond to the ISO14001 standards when the company acquired the certification in 1997. During the three-year period since the acquisition of the ISO14001 standards, the Malaysian managers have played important roles in assessing achievements and reviewing objectives. The company has already set up practical goals for the year 2002 and the movements for achieving these goals are effectively integrated in the environmental conservation system of the company. The company's business is mainly engaged in assembling works and therefore does not produce industrial wastewater. Naturally, the company's environmental load is only emission of the vapor from an organic solvent and a fume containing lead used as flux in soldering.

Figure 2-3-1 Environmental Policy of Japanese Parent Company of Company F

Principle
Our company believes that conservation of the global environment is one of the most important issues that commonly affect human beings, and gives sound consideration to environmental conservation in all aspects of our corporate activities.
Policies
1. Our company will improve all necessary structures within the group companies throughout the world to effectively promote their environmental conservation activities.
2. Our company will rightly assess environmental impacts of our corporate activities, set environmental targets or objectives to the extent technically and economically possible, and continuously improve quality of our activities for environmental conservation.
3. Our company will abide by all laws, rules and regulations, and agreements on the issues of environment, furthermore, will set our own standards to improve our activities for environmental conservation.

And Other 10 articles

3) Measures Taken by the Company

a. Establishment of the Environmental Management System

Major events since 1992 regarding environmental management system are as follows.

1992 - The company established the Environmental Protection Committee.
- The company promoted planting of trees in the premises of the plant. The company was awarded the grand prix in Hulu Langat District and was awarded the second prize in Selangor State for "Plant with beautiful sight."

1993 The company established a strict procedure for monitoring chemical wastes and household wastes in line with the laws and regulations.

1994 The company prepared an environment lobby where the employees can receive education on environmental conservation.
The company installed a compressing compactor and reduced by half the number of truck traffics for bringing out wastes. Thus, the company contributed to the reduction of fuel consumption and the emission of carbon dioxide.

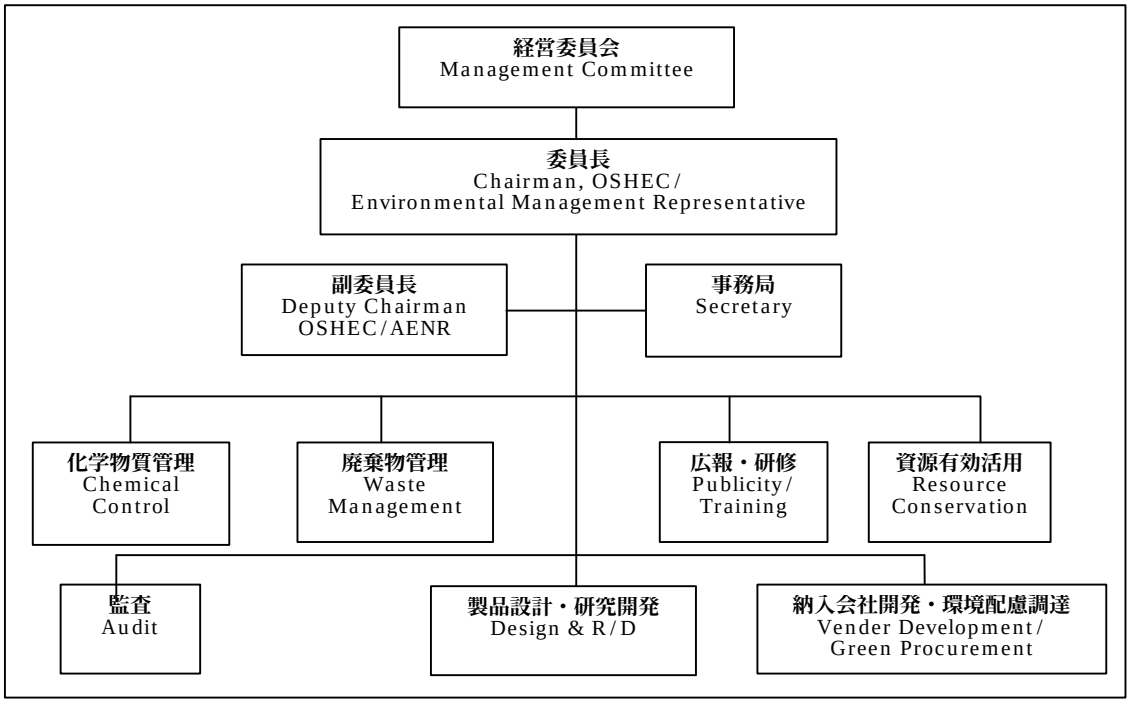
1995 The company reorganized the Environmental Protection Committee as a step for preparation for acquisition of the ISO14001 certification.

1996 The company established a special department in charge of occupational safety, health and environment.
The company set an objective of acquiring the ISO14001 certification within one year and started working for this objective.

1997 The company acquired the ISO14001 certification from a Malaysian accredited certifying organization.
The company established the Occupational Safety, Health and Environmental Committee (OSHEC) to be exclusively in charge of these issues.
The company held seminars to 21 chemical suppliers on enhancement of environmental consciousness and environment-related laws and regulations.
The president of the company was appointed a member of the Committee for Environmental Labeling and the vice president a member of the Committee for Life Cycle Assessment, both being the government committees.

OSHEC reports to the Management Committee chaired by the president of company F. The chairperson of OSHEC is a Malaysian manager. As is shown in Figure 2-3-2 this committee has seven acting subcommittees of which one is the Chemical Control Group. Each group consists of 4 to 5 persons representing workplaces related to the assignment of the group. In the company, this committee takes comprehensive measures towards environment that includes the related issues such as safety and human health to realize synergetic effects.

Figure 2-3-2 Opccupational Safety, Health and Environment Committee (OSHEC) of Company F



The Chemical Control Group controls spent chemicals as well as raw material chemicals so that these may be adequately consumed. The Waste Management Group controls such general wastes as paper and kitchen wastes. The Publicity/Training Group is in charge of enhancing environmental awareness within the company and promoting social contribution in environmental aspects. The Resource Conservation Group is engaged mainly in reduction of electric power consumption. The Audit Group appraises degrees of achievements of goals set by various workplaces not limited to the ISO14001 goals but including safety and human health. The Design & R/D group, recently instituted, incorporates environmental measures from the stage of design to effectively produce new products of minimum environmental load. The Vender Development/Green Procurement Group works together with the suppliers of raw materials and parts so that their manufacturing processes may be improved to minimize their adverse impacts on the environment.

b. Achievements of the Environmental Management System and Objectives (Goals)

The activities promoted by OSHEC since acquisition of the ISO14001 certification have made remarkable accomplishments. The past achievements are evident in the number of items requiring improvement pointed out by the internal and external ISO14001 audits, each done twice a year. The number of items requiring improvement pointed out by the internal audit was 151 in May 1997 but it decreased to 13 in January 1999. Similarly, the number of items requiring improvement pointed out by the external audit was nine in June 1997 but it was none in February 1999.

The company embarked on an aggressive program called Green Management 2002 aimed at achieving the objectives explained below by the year 2002. Each group of OSHEC has formulated the following objectives and is working hard to achieve them. The degrees of achievement of these objectives are evaluated every year and the objectives are modified depending upon the past progresses.

Chemical Control Group

The objective is to achieve zero emission of volatile organic compounds and the fume containing lead.

Waste Management Group

The objective is to reduce consumption of printing and copying paper by 15 %.

Publicity/Training Group

This group enhances employees' awareness on the issue of environmental conservation. This group also works for betterment of the community's environment including planting of trees. In 1997 this group executed the Organization Community Relation Project jointly with the Bureau of Development of the state government. In this program this group took part in cleaning of roads, pruning and planting of trees. The Malaysian manager of OSHEC has acquired qualification of auditor for ISO14001 from the Standards & Industrial Research Institute of Malaysia (SIRIM). In this capacity this manager gives lectures at seminars and training courses of group companies or non-related companies.

Resource Conservation Group

The objective of this group is reduction consumption of electric power by 15 % compared to that of 1997. The measures taken to achieve this objective include such daily practices as, turning off the lights of the room where no work is being done, installing curtains at the inlets and outlets of rooms to prevent cooled air from escaping the air-conditioned rooms, and placing of light shielding screens on window panes to prevent direct sunlight from entering rooms. Another objective is 40 % reduction of wastes that are either incinerated or landfilled.

Design & R/D Group

The group set eight objectives including reduction of the standby electric power to less than one watt, reducing the consumption of polystyrene by 60 % and increasing the rate of recycling to 60 %. Part of design function of the Japanese parent company will be transferred to this group so that design capability of this company may be strengthened to incorporate concept of environmental conservation at the design stage of new products, thereby eventually producing products of minimum environmental impacts.

Vender Development/Green Procurement Group

The objectives of this group concern the suppliers of materials and consumables. This group helps them use an increasing amount of recycled materials, reduce consumption of packaging and packing materials, realize more rational transportation, and supply more materials that do not produce dioxins when

incinerated or disposed of. This group also provides the suppliers with technical assistance in converting their processes into more environmentally compatible ones.

d. Exhaust Gas Treatment

Standards are set for Company F for emission of dust and lead. The company asks a registered testing company to conduct monitoring and analysis. The Company reports the results of analysis to the Department of Environment. Figure 2-3-3 shows one example of such data. The effluent gas satisfies the standards at all six emission points.

Figure 2-3-3 Emission Standards and Measurement Examples

(Unit: mg/Nm^3)

Items	Standards	Emission Point (within the plant premises)					
		A	B	C	D	E	F
Dust	400	1.01	1.01	5.40	0.34	0.68	0.34
Lead	25	16.86	4.22	14.33	22.77	7.60	8.45

Aside from the emission standards, concentrations in the air of lead and methylene chloride and tolerable noise level are specified from the viewpoint of maintaining safe working conditions by the Factories & Machinery Regulation of 1989. These data are also measured by a registered testing company once a year.

e. Solid Waste Treatment

The dross, a mixture of oxides of lead and tin, is produced in the soldering process at a rate of about 16 kg a month. This is sold to a registered recovering company. In the plant, waste flux is also generated, actually a degradated iso-propyl alcohol used as a flux, at a rate of about 12 kg a month. The company subcontracts a registered treating and recovering company to recover Iso-propyl alcohol from waste flux by paying a treating fee. The stained gloves produced in the soldering process, waste cloth and spent chemicals are consigned to Kualiti Alam, the only authorized final treating and disposal company of Malaysia for incineration or landfilling. The household wastes are disposed at a landfill site located outside the industrial estate managed by the local government.

Case 7 A Malaysian Manager Playing Central Roles for Preparation for Acquisition of the ISO14001 Certification

1) Outline of the Company

Company G
Business line: Manufacture of such electronic devices as variable resistors, tuners
Number of Employees: 6,300
Start of operation: 1989
Location of the plant: An industrial estate in Negeri Sembilan State 50 km to the south of Kuala Lumpur
Japanese equity ratio: 100%

2) Background

The company's products are internationally traded. With rising concern of their customers about environmental conservation, it is now inevitable for the company to acquire the ISO14001 certification. Besides, one of the management policies of the company is to give sufficient environmental consideration in its business activities. The company has to acquire the certification as an evidence of the company's policies.

The acquisition of the ISO14001 certification requires a leader with professional expertise in environmental management. On the other hand, Company G's Japanese expatriates have been reduced to only slightly more than ten who are engaged mainly in transfer of production technology as part of the rationalization program.

Under such a circumstance, it was considered most reasonable to find and assign experienced local expert for preparation of the ISO14001 certification. As of the end of 1999, 116 plants or factories have acquired the ISO14001 certification in Malaysia. This means that Malaysia has a good number of local experts. The company also considered that the preparation for acquisition of the ISO14001 certification would work well under a Malaysian leader. The company expected the fact that Malaysian leader tackles with environmental problems would enhance all employees' awareness on environmental conservation.

3) Measures Taken by the Company

a. Establishment of the Environmental Management System

Company G decided in 1998 to acquire the ISO14001 certification and began selecting a right person for the leader. The company decided to recruit an experienced person because it would take long time and large cost to train one of the employees to the necessary professional level. In the beginning of 1999, the company recruited a suitable expert and appointed him a manager in charge of facilities and equipment.

This manager had a degree in mechanical engineering in the United Kingdom. After returning to Malaysia, he worked for an electric utility company and a bearing manufacturer of Swedish capitals. While he was in the bearing manufacturer, he obtained qualification as environmental auditor of ISO14001 and gained experience related to the ISO14001 standards through actually working in this field. The company started preparing for acquiring the ISO14001 certification in March 2000 with placing this manager as a core person of the activities.

The company made a statement on its environmental policy in April 1999 and established the Environmental Management System (EMS) Committee. The environmental policy was a very simple and easy to understand, consisting of six clauses which include environmental consideration, reduction of waste, concerted effort of the employees for achieving the objectives. Figure 2-3-4 is the organization chart of the EMS Committee. EMS Steering Committee headed by a Malaysian director was instituted directly below the Board of Directors which is presided over by the president. The Steering Committee consists of seven members including Japanese expatriates and Malaysian executives. The position of Environmental Management Representative (EMR) was instituted to support the Steering Committee.

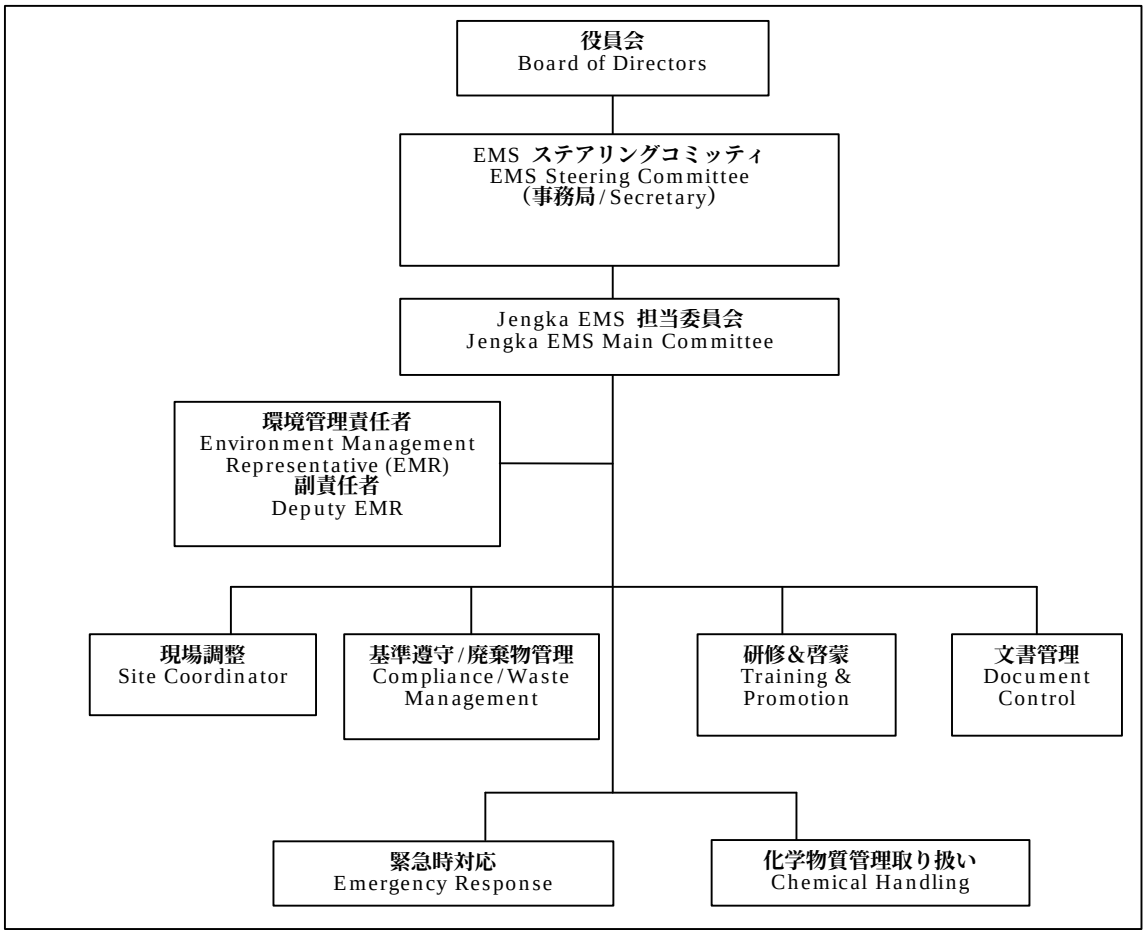
The newly recruited Malaysian expert was appointed the EMR and the secretary to the EMS Steering Committee.

The Steering Committee has six working groups; namely, the Site Coordinator Group, Compliance/Waste Management Group, Training & Promotion Group, Document Control Group, Emergency Response Group and Chemical Handling Group.

Company G has another plant in Jengka of Pahang State, which has started preparation for obtaining the ISO14001 certification before the above-described plant.

The company's environmental objectives for the ISO14001 are focused on energy saving. The objectives include improvement of the drain system, replacement of mercury lights with fluorescent lights, turning off unnecessary lights, right temperature control of air conditioners.

Figure 2-3-4 EMS Committee of Company G



b. Environmental Impacts

The plant does not discharge industrial wastewater because the plant is engaged mainly in assembling parts. The household wastewater is subject to control. The effluent gas subject to control are fumes containing lead and gas containing vapor of the flux. The household wastewater is treated by aeration in a sewerage treatment tank packed with gravel. The A Standards shown in Figure 2-3-5 of the Malaysian government is applied to the treated household wastewater. The A Standards are very strict ones applied to effluent water discharged upstream of the intake point of the drinking water.

Figure2-3-5 Effluent Standards for Company G

(Unit: mg/liter)

Item	Temperature, °C	pH	BOD	COD	SS	Oil & Grease
Standard	40	6.0 - 9.0	20	50	50	N.D.

There are four sewerage treatment tanks to each building. Each sewerage treatment tank has it own discharge point to the river independent of other sewerage treatment tanks. The company commissions a registered testing company to take samples from every discharge point, and to analyze them every three months. The results of analysis have been below the standards so far. The company has been reporting the results of analysis to the Department of Environment.

The wastes the plant discharges include solder debris, spent oil and bottles for chemicals produced at the soldering process. The solder debris is sold to a licensed treating and recovering company. The plant discharges as much as 250 drums of spent oil which is also sold to a licensed treating and recovery company.

c. Others

The company promotes in the plant the 5P movement, the Malaysian equivalent of the Japanese 5S movement promoting good organization, orderliness, cleanliness, standardized cleanup and discipline. The company finds it difficult to have the employees understand cleanup as part of their works. It is their common understanding that cleanup is a job for those who specialize in it. They also have a tendency not to regard such naturally degradable things as wood chips and cigarette ends as subject of cleanup, though they consider plastics and glass debris refuses to be picked up.

Case 8 Example Trying to Acquire the ISO14001 Certification with Energy Conservation as a Main Objective

1) Outline of the Company

Company H
Business line: Manufacture and sale of flush toilet seats with warm water cleansing function
Number of Employees: 359
Start of operation: 1997
Location of the plant: An industrial estate in Negeri Sembilan State 60 km to the south of Kuala Lumpur
Japanese equity ratio: 100 %

2) Background

Company H produces typical consumer goods, and it needs to give consumers with a good impression about environmental conservation for its manufacturing processes. The company has therefore decided to obtain the ISO14001 certification as a means of enhancing the public image of the company.

The company had set up objectives for reducing the environmental load. However, the manufacturing processes are mainly assembling lines; therefore, their environmental load is basically very low since the beginning, with very little wastewater and waste gas being emitted. So, the company has decided to concentrate on reducing consumption of electric power, which leads to reducing emission of carbon dioxide, a substance causing the global warming.

The company has chosen this industrial estate for the location of the plant to give a good corporate image in another way. This industrial estate is called “Industrial Park” instead of “Industrial Estate.” As the name implies, this industrial estate really gives an impression of a park with lot of greens with no poles to support cables. Cables are all laid underground. This industrial estate is designed to harmonize with the surrounding residential areas.

3) Measures Taken by the Company

a. Establishment of the Environmental Management System

All the 16 group plants located in Japan have been instructed by the head office to acquire the ISO14001 certification by the end of the year 2000. This instruction is not necessarily applicable to overseas plants. Nevertheless, Company H has decided of its own to proceed with the schedule applied to the Japanese plants. The company started in October 1999 preparing for acquiring the ISO14001 certification. The company has decided to send their 21 Malaysian managers for training and seminars for ISO14001. As objectives, the company chose the reduction of electric power consumption and household waste amount.

The company plans to adopt a measure particularly effective in the tropical zone. This measure is to fully cover the roofs with a heat insulating paint developed by NASA as one of the technologies for space exploration. This paint is very effective in reflecting the intense direct sunlight of the tropical zone and helps prevent the building temperature from rising, thereby reducing electric power consumption for air conditioning. It has been found that exposure to direct sunlight is the greatest factor in raising the building temperature. This measure should be very effective in this area where air conditioning accounts for the greater part of electric power consumption. This measure is reported to have lowered the inside temperature of a building in Singapore by 5°C. The cost is estimated at 1,700 yen/m^2 but this cost would be paid back in two years.

Reduction of paper consumption is planned to reduce household wastes. The company will introduce a new system of managing orders through internet instead of sending paper vouchers both inside and outside the company. Every Malaysian manager is equipped with one portable note-type computer, for promoting paperless business transactions.

b. Wastewater Treatment

The plant does not dispose of industrial wastewater, exhaust gas nor hazardous wastes because the plant is

mainly engaged in assembly works. The household wastewater is only subject to control. The wastewater is discharged to a river running near the plant. The discharge point is located upstream of the intake point of the drinking water; therefore, the very severe A Standards of the government are applied to the wastewater from the plant. The wastewater has to meet all the standards specified in 23 items. The company has been asked to regularly monitor the following six items shown in Figure 2-3-6. The standard for BOD, 20 mg/liter, is as strict as one-eighth the Japanese standard of 160 mg/liter.

Figure 2-3-6 Effluent Standards for Company H

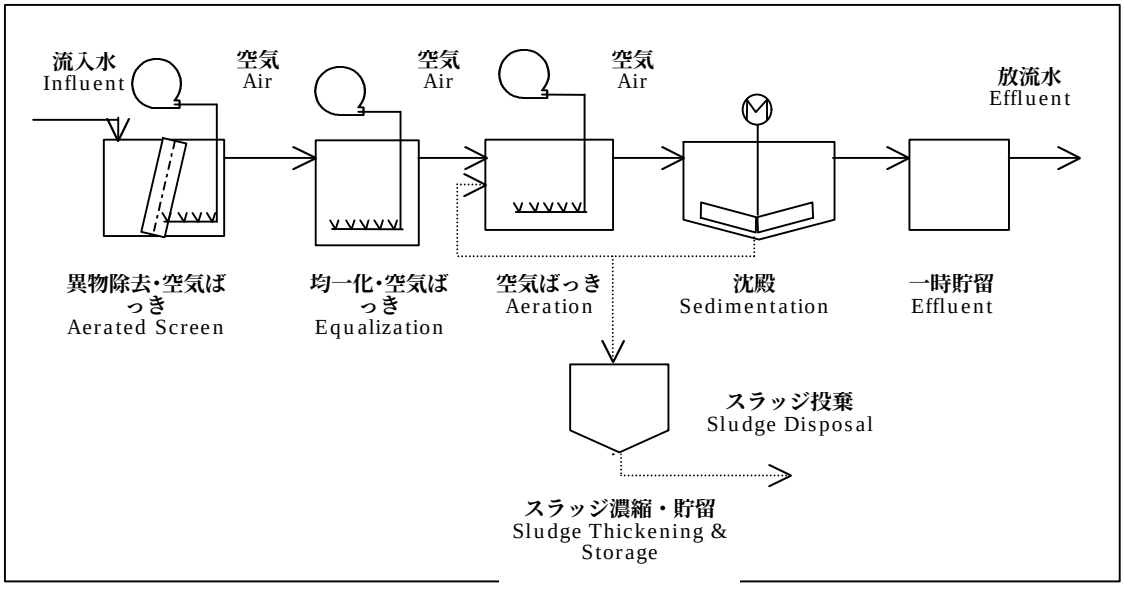
(Unit: mg/liter)

Item	Temperature, °C	pH	BOD	COD	SS	Oil and grease
Standard	40	6.0 - 9.0	20	50	50	N.D.

The company operates two trains of the wastewater treatment plant shown in Figure 2-3-7. The wastewater entering the plant goes through an aerated screen to remove such foreign materials as plastic bags. Then, the wastewater enters the equalization tank where water is agitated by aeration to be homogenized. Subsequently, the wastewater is subjected to activated sludge treatment whereby organic substances are decomposed by biological treatment while being aerated. The bio-treated water is fed to the sedimentation basin where the water is separated into clear supernatant water to be discharged and sludge. The sludge is recycled back to the aeration tank to be used for biological treatment. A portion of the sludge withdrawn from the sedimentation basin is taken out of the system as excess sludge. The excess sludge is concentrated in the sludge thickening & storage tank. The concentrated sludge is treated and disposed of by the authorized disposal company.

The unique feature of this treating system is intense aeration. Normally, aeration is limited to biological treatment. This system starts aeration from the beginning at the point of receiving. The extended period of time during which the wastewater is intensely in contact with air promotes decomposition of organic substances. The company asks a testing company to measure BOD, COD and pH of the treated water every three months and reports the results of tests to the Department of Environment. The two trains have a combined capacity to treat the household wastewater for 574 people. The two units have allowance of capacity for the present number of people working in the plant. The allowance of capacity and intense aeration combined make the effluent water clean enough to satisfy the standards.

Figure 2-3-7 Flow of Household Wastewater Treatment for Company H



c. Solid Waste Treatment

The plant produces such wastes as plastics, cardboard boxes, used paper, kitchen wastes and defective products. The plant treats them in the following manners.

Plastics: 4 tons/month of plastic waste is generated such as runner channel rejects and defective plastic products. The plastic waste is sold to a recovery company at a price of 0.60 yen per kilogram. The recovery company grinds the waste into small chips and reuses them. In June 1999, the company remodeled portion of excess quality of the products and reduced the rate of defective products, with the help of the Japanese parent company.
Cardboard boxes: The plant sells the used cardboard boxes to a recycling company at a price of 0.10 yen per kilogram.
Used paper: The plant discharges about 500 kg of used paper a month, though the plant uses both sides of paper. The industrial estate managing company, an affiliate of the public corporation which has developed this industrial estate, periodically collects used paper.
Kitchen wastes: The industrial estate managing company periodically collects the kitchen wastes.
Defective products: Since this industrial estate is designated as bonded area, even the defective parts are not allowed to be in market. The defective products are handed over to disposal company in the presence of customs officials. The disposal company comes once in every three months in a three-ton truck to pick up the defective products and landfills them at the disposal site designated by the customs.

d. Others

When the laws and regulations about environment are revised, such information is obtained from the Industrial Coordination Council. The council members are local representatives of the Malaysian government and representatives of the business companies. The council acts as a place for information exchange on such issues as requests from industries and revisions of laws and regulation. The council has a yearly schedule and holds a meeting every month. The latest government information, for example, was informed at the monthly meetings by the Department of Environment in August 1999 and by the customs in June 1999. In the meetings, members feel free to make any inquiry.

Case 9 Example of Making Remarkable Achievements in Energy Conservation and Resources Conservation under the ISO14001 Standards

1) Outline of the Company

Company I
Business line: Manufacture of electric circuit parts
Number of Employees: 1,250
Start of operation: 1974
Location of the plant: An industrial estate in Selangor State 16 km to the west of Kuala Lumpur
Japanese equity ratio: 100%

2) Background

Company I and its overseas group companies export their products to many countries in the world including Europe. Therefore, its brand name is world-famous. Their head office in Japan gives instructions on their environmental measures to its all overseas subsidiaries including the acquisition of the ISO14001 certification by the end of 1998. Since the Malaysian government also has asked the industries to reinforce their measures for environmental conservation, the company needed to positively respond to the request of the government though the acquisition of certification.

Company I started preparation for acquiring the ISO14001 certification in November 1997 and successfully obtained the certification in December 1998. Since the plant is engaged mainly in assembling electronic parts, it has very little environmental loads with no industrial wastewater or industrial waste gas. The company, however, has made remarkable achievements in reducing raw material consumption and electric power consumption, effectively working under the ISO14001 environmental management system.

3) Measures Taken by the Company

a. Establishment of Environmental Management System

November 1997	Invite a consultant from Japan for training people at manager level on the concept of the ISO14001
December 1997	Company's own evaluation of the Environmental Management System
January 1998	Application to an accredited certifying organization and establishment of the Steering Committee
	Declaration of company's environmental policies
	Identification of the problems in the environmental aspect and setting up of environmental objectives
	Preparation of the documents for environmental management system
April 1998	Voluntary auditing by the company
November 1998	Auditing by the accredited certifying organization
December 1998	Acquisition of certification

Company I's environmental policies cover the most important and basic rules. They are, for example, trying not to generate emitting substances from the company's activities that have environmental impacts rather than taking measures for emissions after any problem appears, and continuously enhancing environmental consciousness at all levels of the company's organization.

In an effort to identify problems in the environmental aspect, the company distributed questionnaires to all workplaces so that people in each workplace may find out problems.

b. Performance of the Environmental Management System and Future Targets

Since the plant discharges very little of industrial wastewater or hazardous wastes that has direct impacts on environment, the company set up objectives for reducing the raw material plastics and electric power consumption which would indirectly reduces the environmental load. Figure 2-3-8 shows degree of achievement of each objective for fiscal 1998 and fiscal 1999.

The company has set the unique environmental targets so that achievement may be easily evaluated. Reduction of plastics consumption, yields of defective products and electric power consumption are expressed in terms of achievement per one piece of product. Reduction of office paper consumption is expressed in terms of one million pieces of products sold. The figures for 1999 represent the achievement up to August. The unit used for the office paper, rim, represents 500 sheets.

Figure 2-3-8 Environmental Targets and Degree of Achievement

Item	Targeted reduction	Fiscal 1998	Fiscal 1999 (up to August)	Achievement
Reduction of plastics consumption	5.0 %	3.03 %	6.06 %	121 %
Defective products yields	0.97 %	1.02 %	0.96 %	101 %
Reduction of office paper consumption	14.5 rims	15.3 rims	12.0 rims	121 %
Reduction of electric power consumption	0.15 kWh	0.19 kwh	0.21 kWh	71.4 %
Use of trichloroethylene	Terminated	Terminated by end of March		

Regarding consumption of plastics, yield of defective products and consumption of office paper, the targets were achieved by the end of August 1999. By that time, reduction of electric power consumption was achieved to the extent of 70 % and is expected to be achieved by the end of March 2000, or the end of fiscal 2000. The company promotes reuse of spent plastics produced in the manufacturing processes. Presently, the rate of recycling is low; however, it could be raised more to further reduce plastics consumption.

Use of trichloroethylene, a solvent formerly used in the degreasing process, is not prohibited in Malaysia. Notwithstanding, the company terminated the use of trichloroethylene in March 1998 in line with the policy of the Japanese parent company.

The company considers the following objectives for the year 2000 and onward.

- Reduction of the consumption of stamping oil
- Reduction of the use of hazardous chemicals
- Reduction of generation of metal scraps
- Use of adhesives with a low environmental load
- Use of lead-free solder

There is an increasing pressure, particularly in Europe, on reduction of lead-containing solder use. The Japanese parent company has decided to replace the lead-containing solder by lead-free solder by the end of March 2001. Tentatively, Company I plans to cut by half the consumption of lead by the end of September 2000. Company I participates in the R&D of the parent company to develop substitutes for lead-containing solder. The R&D program also include development of metal-to-metal joining technologies without depending on solder.

c. Others

The plant discharges stained waste cloth and spent oil. These are handed over to a registered contractor, which eventually brings them to Kualiti Alam, the only authorized waste disposal company, for treatment and disposal.

Section 4
Other Examples of Innovative Environmental Practices

Most of Japanese companies in Malaysian take voluntary measures for environmental problem in addition to those requested by the Malaysian government. The cases reported in this section include treatment of wastewater containing fluorine, measures against trichloroethylene, and monitoring the quality of underground water by checking water contamination by heavy metals.

Case 10 Example of Taking Measures in Anticipation of Regulations on Fluorine

1) Outline of the company

Company J
Business activities: Manufacture and sale of quartz crystal units
Number of employees: 2,100
Start of operation: 1979
Location of the plant: Industrial Estate in the State of Selangor 20 km to the west of Kuala Lumpur
Japanese equity ratio: 100%

2) Background

Company J has 23 % share of quartz crystal products in the world market. The products are exported to many countries in the world including Europe, where people are particularly sensitive to environmental issues. Company J makes every effort not to cause any environmental problem in order to avoid significant damage on its management. The process of etching quartz blanks employs fluorine (F), which is included in the wastewater from this process. Although there is no wastewater standard on fluorine in Malaysia now, the company has decided to take necessary measures to prevent fluorine discharge from the plant in anticipation of future official regulations on fluorine discharge.

3) Measures Taken by the Company

a. Wastewater Treatment

The manufacturing process generates wastewater containing fluorine, heavy metals, acids, alkalis, and abrasion powder slurry. Figure 2-4-1 shows the wastewater standards indicated by the Malaysian government. Although the government standards do not include fluorine, the company has voluntarily included it in the standards in anticipation of regulations to be imposed on fluorine in the future. The company's standard, 8 mg/liter, is stricter than the Japanese government standard, 15 mg/liter. The company has adopted this standard, because the Malaysian government tends to establish standards stricter than the Japanese government standards.

Figure 2-4-1 Effluent Standards for Company J

(Unit: mg/liter)

Item	pH	F	BOD	COD	SS
Standards	5.8 to 8.6	8	50	100	100

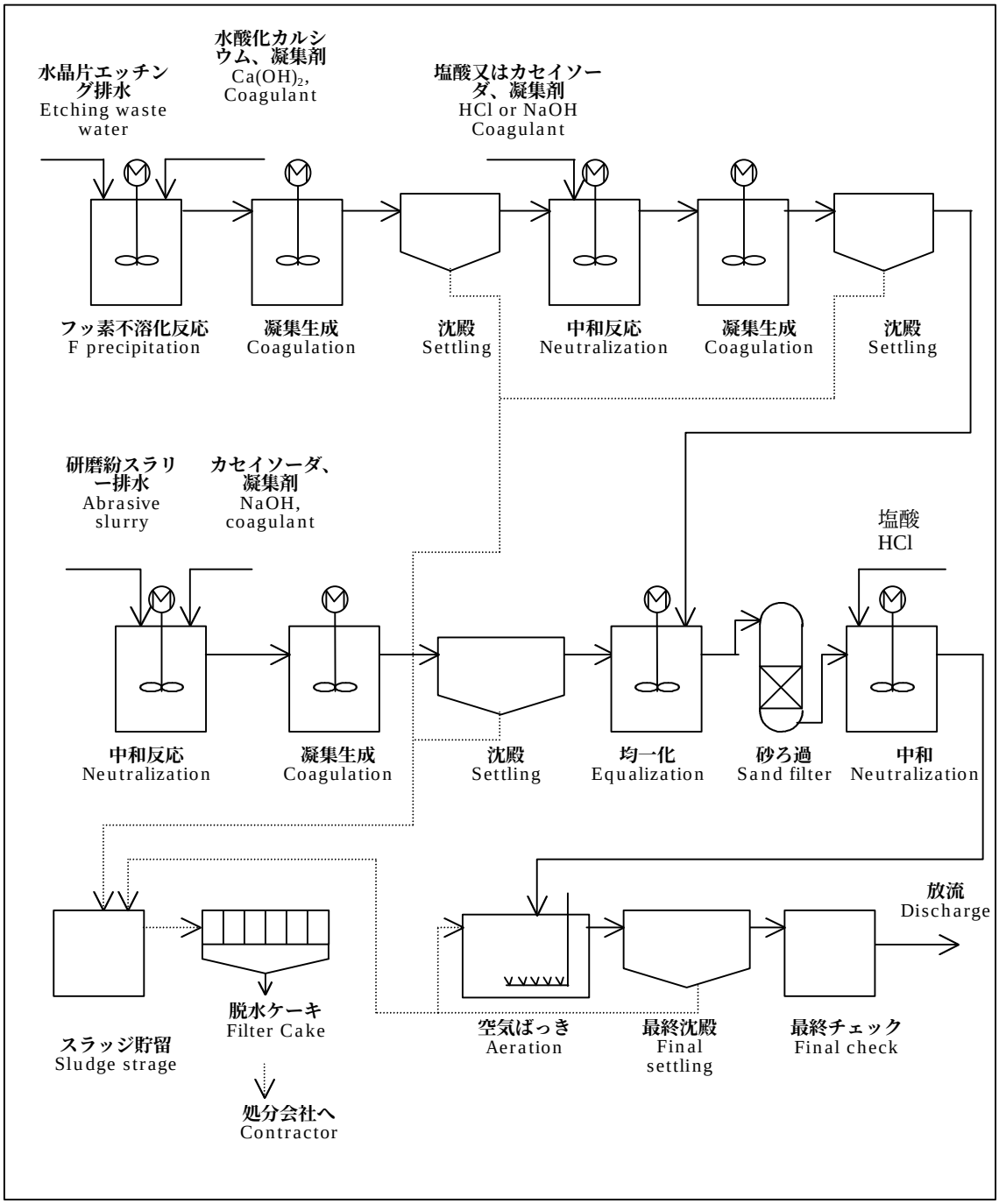
The company installed a wastewater treatment facility shown in Figure 2-4-2 to satisfy the above wastewater standards. There are two wastewater streams originating from two systems. One is the etching process of quartz blanks which generates wastewater containing fluorine and the other is the cutting and grinding process of quartz blanks which generates wastewater in the form of slurry of abrasion powder.

First, calcium hydroxide is added to the wastewater containing fluorine to convert fluorine into water-insoluble calcium fluoride. A coagulant is added to the wastewater to coagulate fine crystals of calcium fluoride to large aggregates. The aggregates are settled in the settling basin, and highly alkaline supernatant is generated. This supernatant is neutralized by adding hydrochloric acid. As the supernatant is neutralized, more coagulated masses are produced, which settle and more supernatant is generated.

A coagulant is added to the slurry wastewater containing abrasion powder to coagulate suspended abrasion powder, and to separate them from water by leaving in the settling basin. The supernatant thus generated is blended with that from the above etching process. The blended supernatant is homogenized and sand-filtered to remove fine coagulated masses, which have not been removed by settling. Subsequently, the wastewater is aerated to decompose organic substances by the help of microorganisms. Sludge is removed from the biologically treated wastewater by settling in the final settling basin to produce treated water. The treated water is discharged after its pH value is checked. The company has

a contract with a government-registered analysis laboratory for testing all items except fluorine once a month and the company reports the results of the test to DOE. Currently, all tested items satisfy the standards. The company will soon begin analyzing fluorine.

Figure 2-4-2 Flow of the Wastewater Treatment of Company J



b. Solid Waste Treatment

The manufacturing processes generate scheduled wastes such as wastewater treatment sludge, oil-containing sludge, waste oil, and abrasion powder slurry. The company had been obligated to store them in its own premises until Kualiti Alam (KA), an only final waste disposal company in Malaysia, was established in 1997. The sludge stored in the premises reached 1,400 tons, almost exceeding the limit of its storing capacity. Since KA started its operation, the company has asked KA to landfill the wastewater treatment sludge and the sludge containing abrasion powder, and to incinerate the oil-containing sludge. The landfill and incineration costs for the company amounted to 10.23 million yen and 42.35 million yen respectively, causing a heavy financial burden on the company. The wastewater treatment sludge, containing heavy metals, used to be exported to the USA for heavy metal recovery, but now the export is prohibited.

c. Others

Other than the measures explained above, the company monitors noise, fume dispersion of acids such as hydrofluoric acid, hydrochloric acid, nitric acid, and sulfuric acid, atmospheric concentrations of these acids, oil mist, and dust. The measured values of these items are all well under the standards.

The company has started preparation for acquisition of the ISO14001 certification targeted for October 2001.

Case 11 Example of Hexavalent Chromium Removal by Ion-exchange Resin and Recycling of Water

1) Outline of the Company

Company K Business line: Manufacture and sale of automotive parts Number of Employees: 1,100 Start of operation: 1983 Location of the plant: An industrial estate in Selangor State 30 km to the south of Kuala Lumpur Japanese equity ratio: 81%

2) Background

Company K supplies automotive parts to a local automobile manufacturer and has a large share in the parts supplying market. The Malaysian government has set very strict effluent standards for the industrial wastewater from manufacturing plants. Under such a circumstance the company has paid all precautions to environmental conservation.

The effluent stream from the chromate process, which gives corrosion resistance to the metal surface, contains hexavalent chromium (Cr^{6+}). Formerly, the company treated this wastewater in a wastewater treatment plant, equipped with the conventional reduction process, to lower the hexavalent chromium concentration to the level meeting the strict standard set by the government. However, with increasing output of the products, the amount of chromium-containing wastewater increased to the level more than what this old wastewater treating system could adequately cope with. There was another reason for justifying a change in the treatment method. The disposal fee of sludge from the plant paid to Kualiti Alam, the only final treating and disposal company of Malaysia, would become more than three times if a large amount of sludge contains even a trace of hexavalent chromium. For this reason, the company introduced the ion-exchange resin method to give a complete treatment of hexavalent chromium on one hand and to separate the two kinds of sludge, one from the chromium treatment and the other from other sources, on the other.

3) Measures Taken by the Company

a. Wastewater Treatment

The wastewater of this plant may be broadly classified into two kinds: wastewater from the painting process containing paint debris, and that from the metal surface treatment process containing acids and alkalis. The latter wastewater contains chromium. Before the plant can discharge the wastewater to public waters such as rivers, the wastewater must meet the strict A standards specified by the Malaysian government as shown in Figure 2-4-3.

Figure 2-4-3 Effluent Standards for Company K (Unit: mg/liter)

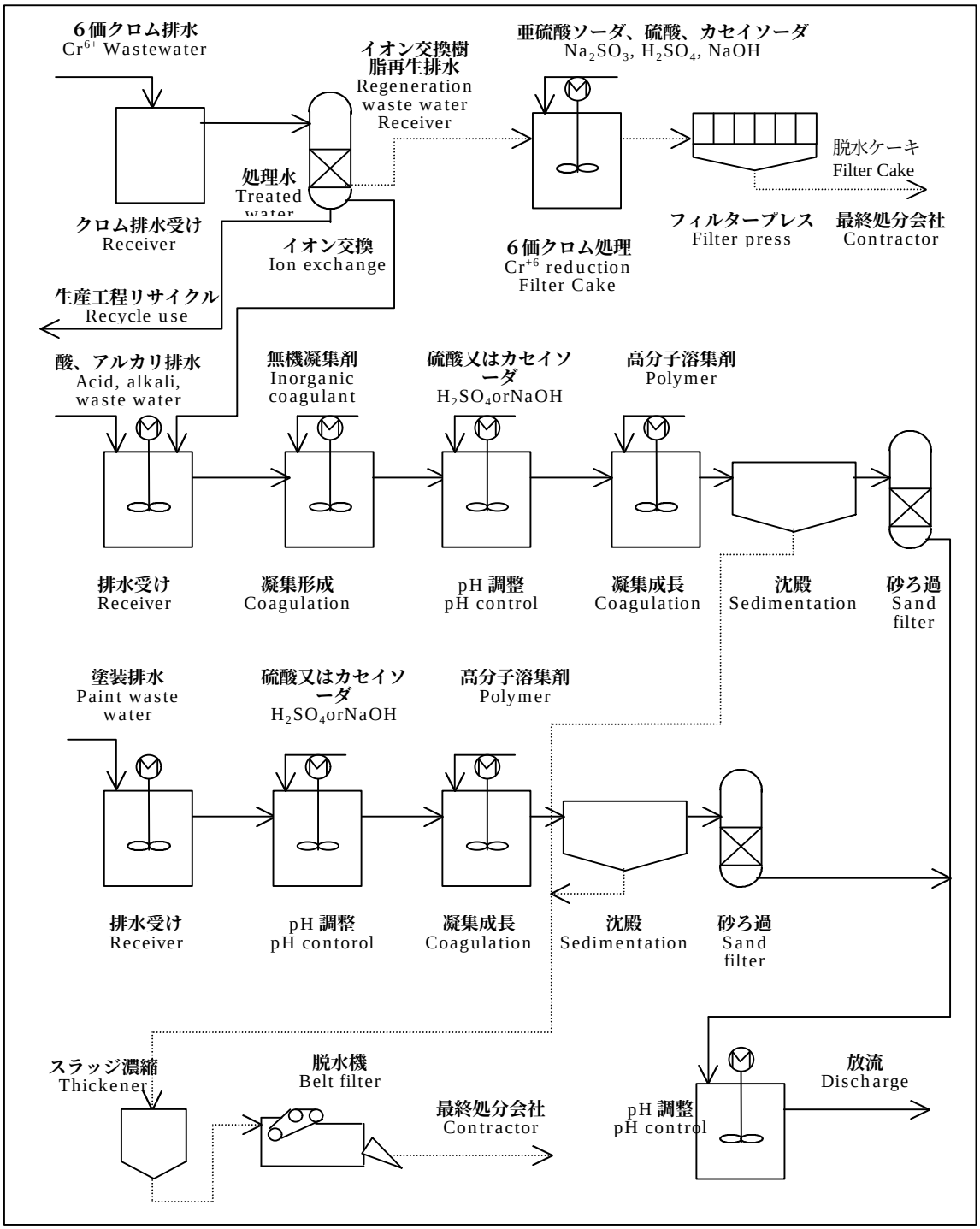
Item	pH	COD	F	Cu	Fe	Zn	Pb	T-Cr	Cr^{6+}
Standard	6 - 9	50	15	0.2	1	1	0.1	0.2	0.05

The standard for hexavalent chromium, 0.05 mg/liter, is one-tenth as strict as the Japanese government standard, or 0.5 mg/liter. The standard for fluorine (F) was not specified by the central government but was orally indicated by the Selangor State Office of Department of Environment (DOE). The company has installed a wastewater treatment plant shown in Figure 2-4-4 to meet these standards.

The wastewater containing chromium is passed through a bed of ion-exchange resin which adsorbs hexavalent chromium. The treated wastewater rid of hexavalent chromium is returned to the production process for reuse. The ion-exchange resin has a limited capacity beyond which the resin cannot adsorb hexavalent chromium. The ion-exchange resin which has adsorbed hexavalent chromium to a certain level is washed with a chemical to be regenerated. The concentrated hexavalent chromium solution produced when the resin is regenerated is received in a tank where hexavalent chromium is converted into harmless trivalent chromium by reduction with sodium sulfite while the pH value is being minutely

controlled by addition of either sulfuric acid or sodium hydroxide. The trivalent chromium is settled in the form of a hydroxide and separated from the liquid phase as sludge. This reduction reaction is done in a batch-wise fashion and therefore can be easily and strictly controlled. The ion-exchange resin is purchased from a water treating reagent company of Japanese capital.

Figure 2-4-4 Flow of the Wastewater Treatment of Company K



The pH value of the wastewater from the painting process is adjusted at first. A coagulant is added to the wastewater to coagulate and settle the suspended solid. The fine suspended particles that still remain

after coagulation and sedimentation are removed by the sand filter. The wastewater from the sand filter is mixed with the treated acid and alkali wastewater stream and discharged after its pH value is checked.

Two sand filters were added in 1997 to cope with the increased amount of wastewater generated as a result of increased plant production. The company also added another pH guard basin in 1998 to ensure that the quality of the treated water is guaranteed before discharging. The construction of this wastewater treatment plant was done by a wastewater treating company of Japanese capital.

The discharged water is sampled and analyzed in the laboratory every day. Every month the company asks a registered testing company to analyze the discharged water. Even the yearly maximum concentration of hexavalent chromium is far less than 0.01 mg/liter, the government standard. The maximum fluorine concentration was 1.05 mg/liter, also far below the level orally indicated by DOE. The treated water discharged also satisfies all other items of the standards.

b. Solid Waste Treatment

The most noticeable industrial waste is the sedimentation sludge generated from reduction reaction of hexavalent chromium and ordinary wastewater treatment. The sludge of trivalent chromium generated as a result of the reduction reaction is placed in drums and consigned to Kualiti Alam for final treatment and disposal. In Japan there are recycling companies which willingly receive this same sludge because of its high chromium content but in Malaysia it is not allowed to give the sludge to anyone but Kualiti Alam. The sludge from the ordinary wastewater treatment is dehydrated and handed over to Kualiti Alam for final treatment and disposal. The fee for the final treatment and disposal is two to three times as high as that in Japan. Company K therefore has introduced an electric dryer to reduce its weight. The electric dryer reduces water content of the sludge from 80 % to 40 %. Even using the electric drying seems to have an economic merit because the price of electricity is nearly half of that in Japan and the fee for final treatment and disposal is relatively high.

The scheduled wastes include solder debris, spent solvent, spent oil, coolant and paint debris. The solder debris and solvent are handed over to recycling companies but other wastes are consigned to Kualiti Alam for treatment and disposal.

Until Kualiti Alam started its operation in 1997, Company K was forced to store them in the premises of the plant. After more than ten years since the company started its operation, the stock reached 414 tons and the company premises was filled with them up to almost the limit. In 1998, the company brought all stocks to Kualiti Alam for disposal, which cost the company more than 10 million yen at once.

c. Establishment of Environmental Management System

Company K was preparing for acquisition of the ISO14001 certification in January 2000. Although the company dose not receive requests from their customers to obtain the ISO14001 certification, the company decided to obtain the certification because it would help standardize the company's environmental management system and business process.

The company started preparation for acquisition of the ISO14001 certification in December 1998 when the company announced its environmental policies and formulated the ISO14001 Environmental Management Team. This team consists of 15 Malaysian people headed by a Malaysian environmental management leader. This leader, experienced in ISO14001 certification, was recruited for the purpose of acquiring the ISO14001 certification. The two persons in charge of operating the wastewater treating plant are also engaged in promoting the ISO14001 related works. Two British consultants are retained to conduct the company's works to acquisition of the ISO14001 certification. Eleven of the team members are representatives of the plant's eleven sections, one person from each section.

The environmental targets for the ISO14001 include reduction of oil-stained waste cloth, prevention of leakage of chemicals, reduction of the sludge from wastewater treatment and lowering of the noise level.

Case 12 Example of Routinely Monitoring Underground Water for Watching Its Contamination

1) Outline of the Company

Company L
Business line: Manufacture of household electric appliances, i.e., air conditioners, electric fans and refrigerators
Number of Employees: 750
Start of operation: 1991
Location of the plant: An industrial estate in Selangor State 30 km to the west of Kuala Lumpur
Japanese equity ratio: 43.1%

2) Background

In 1965, Company L has advanced to Malaysia before all other Japanese companies, and it has been operating in Malaysia for 34 years since then. The founder of the company has the strong trust from the Malaysian government and he was awarded for his contribution to industrial development of Malaysia. To respond the trust, the company has been remaining progressive in environmental conservation activities, such as acquisition of the ISO14001 certification. Actually, company L was the first in Malaysia to obtain the ISO14001 certification.

Company L has four plants in Malaysia in different locations. The case introduced here pertains to the newest of the four plants built in 1991. The plant has a painting process of the products and a pretreatment process where wastewater containing heavy metals is generated. The geological survey done for plant construction revealed that this location is prone to subside. If land subsidence should really occur and this should damage the piping near the wastewater treatment plant, this could contaminate the underground water with heavy metals. The company then decided to voluntarily monitor heavy metal contamination of the underground water around the wastewater treatment plant to guard against such unlikely events.

3) Measures Taken by the Company

a. Monitoring of Underground Water

As a pretreatment to painting, the metal surfaces are coated with zinc phosphate. In this process wastewater containing zinc and other heavy metals is generated. The wastewater streams are gathered in the wastewater treatment plant as shown in Figure 2-4-5 so that the treated water may satisfy the effluent standards. The treated water is discharged to the sewer outside the plant premises. If land subsidence should occur and should consequently damage the wastewater piping and/or the tank to receive the wastewater, the heavy metals could diffuse underground. It is feared that if this should occur, the high water table could allow underground water containing the heavy metals to seep to the sewer outside the plant premises.

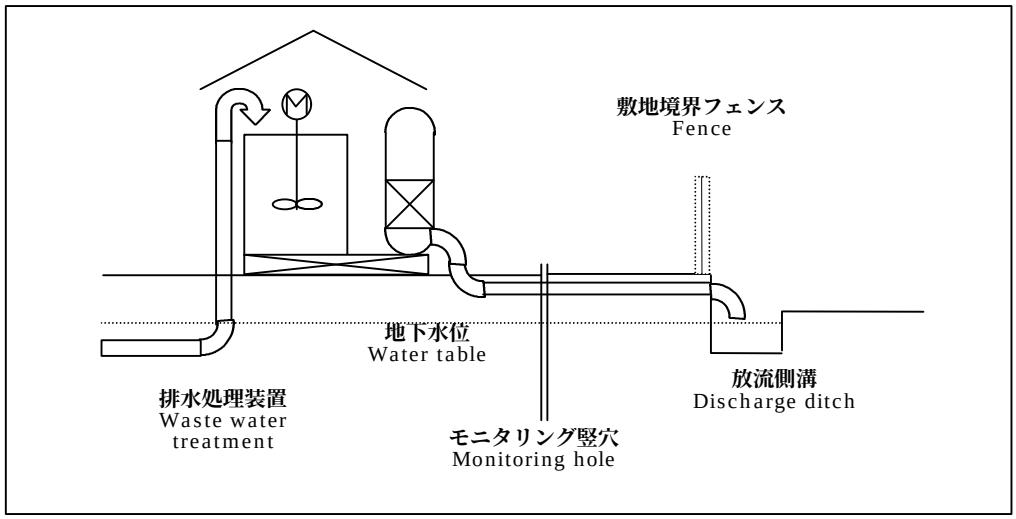
Three holes were drilled between the wastewater treatment plant and the plant border at an interval of about 7 m for monitoring heavy metal contamination of underground water. The holes are 15 cm across and 6 m deep. The water table is about 1.5 m below the ground surface. Samples of underground water are taken every month from these holes and analyzed for heavy metal contents to see whether there is contamination of heavy-metal to underground water. If there is any sign of contamination, the company will take necessary measures to prevent contamination of underground water. The company has been continuously monitoring the underground water since 1991, with no sign of heavy metal contamination up to now. As equipment ages it becomes more susceptible to damage; therefore, this monitoring will be all the more important in the future.

b. Wastewater Treatment

The B standards are indicated to this plant. To satisfy these standards the wastewater treatment plant shown in Figure 2-4-6 was installed. The wastewater is first received in the equalization tank. Then, an inorganic coagulant is added to form coagulated water-insoluble heavy metal oxides. Subsequently, a

high-polymer coagulant is added to make the flocs grow larger. The wastewater is separated into clear supernatant water and sludge in the sedimentation basin. The pH of the clear supernatant water is adjusted and the water is passed through a sand filter to remove fine particles that have not been caught in the upstream treatments. The water is then passed to a bed of activated carbon to remove by adsorption organic compound that may increase the value of COD value. There are three activated carbon adsorption towers of which one is a standby unit. The quality of wastewater always meets the standards by using one activated carbon tower as a spare even when one of other two towers is out of work while replacing saturated activated carbons. The treated water is stored in a retention tank from which the content is discharged to public water after its pH value is monitored by a pH continuous recorder. The pH recorder indicates the trend of pH change and thus enables the operator to take corrective measures before the pH value actually exceeds the standard.

Figure 2-4-5 Facilities for Underground Water Monitoring



The effluent water is analyzed by a testing company once a month for all 22 items specified in the B standards. The company reports the results of analysis to Department of Environment (DOE). The effluent water meets all specified items of the standard.

c. Solid Waste Treatment

The wastewater treating plant generates 4 to 5 tons of dehydrated sludge a month, occupying the majority of the waste. This sludge is regarded as the scheduled waste and it must be consigned to Kualiti Alam, the only final treating and disposal company in Malaysia. Its treating and disposal fee is rather high; therefore, the company installed a dryer to reduce the weight of sludge. The dryer uses electricity as heat source and can reduce the water content of sludge from 80 to about 40 %. The effluent gas from the dryer has an offensive smell. Therefore, the gas is water scrubbed before being discharged to atmosphere. The treated wastewater is used for scrubbing and is returned to the receiving tank of the wastewater treatment plant.

d. Establishment of the Environmental Management System

Company L acted very early for acquisition of the ISO14001 certification. The company organized a study group in September 1995, eager to be the first in Malaysia to obtain the ISO14001 certification. In December 1996 Company L became the first company in Malaysia to obtain the ISO14001 certification as scheduled. Since then, the company provided other group companies with information pertaining to environmental management and extended guidance to them about acquisition of the ISO14001 certification. Today, all the 22 group companies in Malaysia have acquired ISO14001 certification.

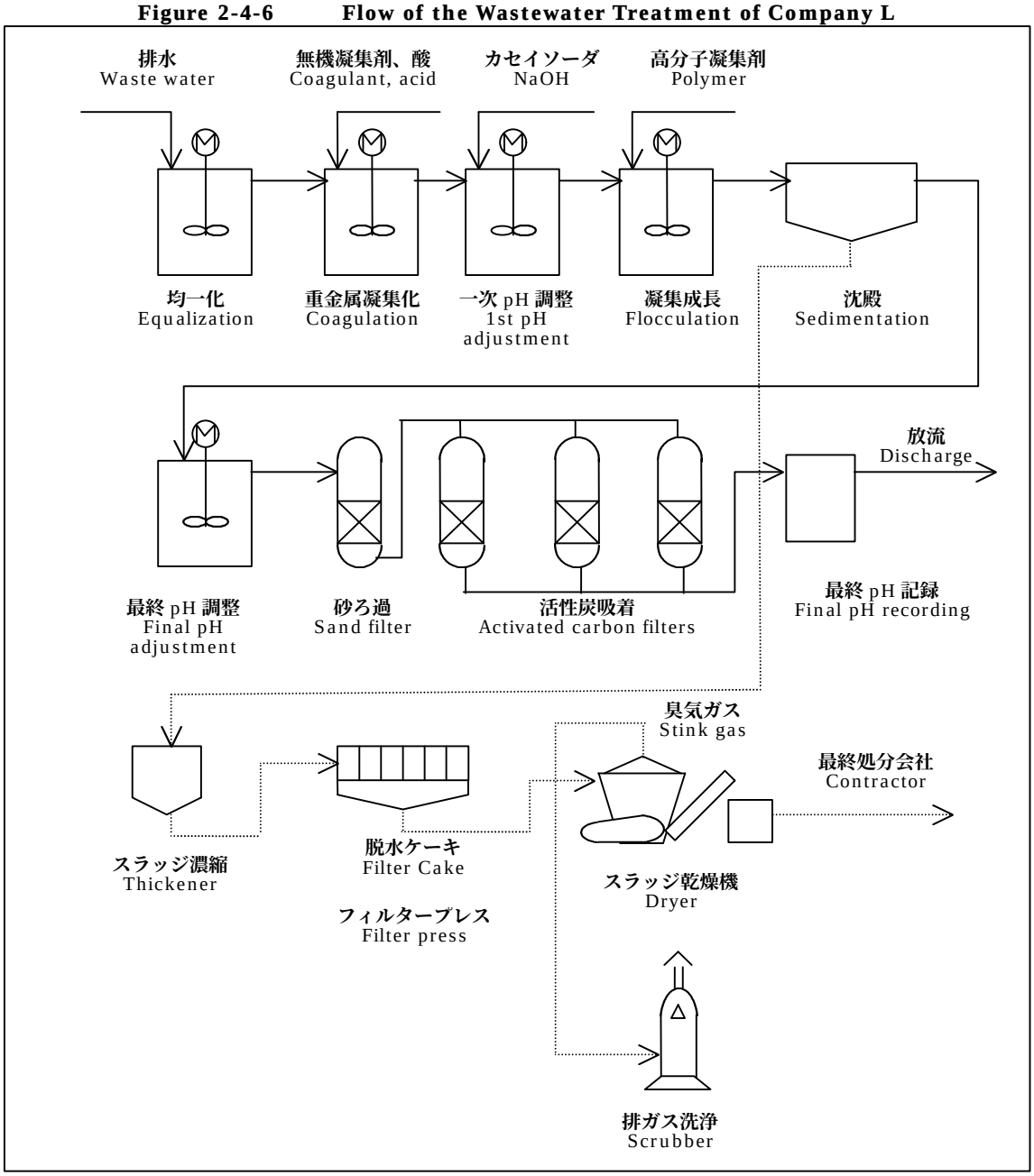
Development of products consuming less energy was made an environmental objective for ISO14001. In May 1998, the company successfully developed a refrigerator model which consumes 30 % less

electric power than the previous model. In June 1998, the company developed a new model of bathroom shower consuming 20 % less electric power than the previous model. The company's objective is to maintain continual improvement and modification of company's products under the ISO14001 system.

e. Others

The company obtains the environment-related information through such industrial associations as the Federation of Malaysian Industries and Malaysian Chamber of Commerce and Industry. When the Malaysian government plans to establish a new law, it conducts hearing opinions and comments from such associations.

Figure 2-4-6 Flow of the Wastewater Treatment of Company L



Case 13 Example of Treating Household Wastewater by Advanced Technologies

1) Outline of the Company

Company M
Business line: Manufacture and sale of optical instruments
Number of Employees: 2,369
Start of operation: 1974
Location of the plant: An industrial estate in Selangor State 16 km to the west of Kuala Lumpur
Japanese equity ratio: 100 %

2) Background

Company M has been in Malaysia for more than 25 years. This industrial estate was developed by the Malaysian Industrial Development Authority (MIDA). When the plant was built, the industrial estate was surrounded by paddy fields. Because of this location being close to Kuala Lumpur the area has become a residential and commercial area. The rivers became more polluted as population increased. Department of environment (DOE) intensifies guidance on the industries so that the effluent standards may be more faithfully observed to prevent further deterioration of the water environment.

The plant is engaged chiefly in assembling; therefore, it does not produce industrial wastewater. However, with an increasing number of employees, the plant now discharges a large quantity of household wastewater, which is treated by a simple septic tank. Recently, however, the plant finds it difficult to meet even the lenient B standards. The company acquired the ISO14001 certification in July 1998. After the acquisition, it happened to have a problem of household wastewater not meeting the standards to be solved in the ISO14001 environmental management. The company has decided to build a newest and reliable wastewater treating facility already adopted by the new international airport commissioned in July 1998.

Meanwhile, Company M's products are exported throughout the world.

3) Measures Taken by the Company

a. Wastewater Treatment

Figure 2-4-7 shows the effluent standards indicated to Company M. These are B standards applicable to wastewater discharged to the public waters downstream of the intake point of drinking water. The present wastewater treatment system depending on a septic tank is not capable to meet either BOD or COD standards. Several trials including replacement of gravel in the septic tank have been made but all proved not effective enough. The company has been given by DOE a time allowance on condition that the company will submit a renovation plan of the wastewater treating system by the end of January 2000.

Figure 2-4-7 Effluent Standards for Company M

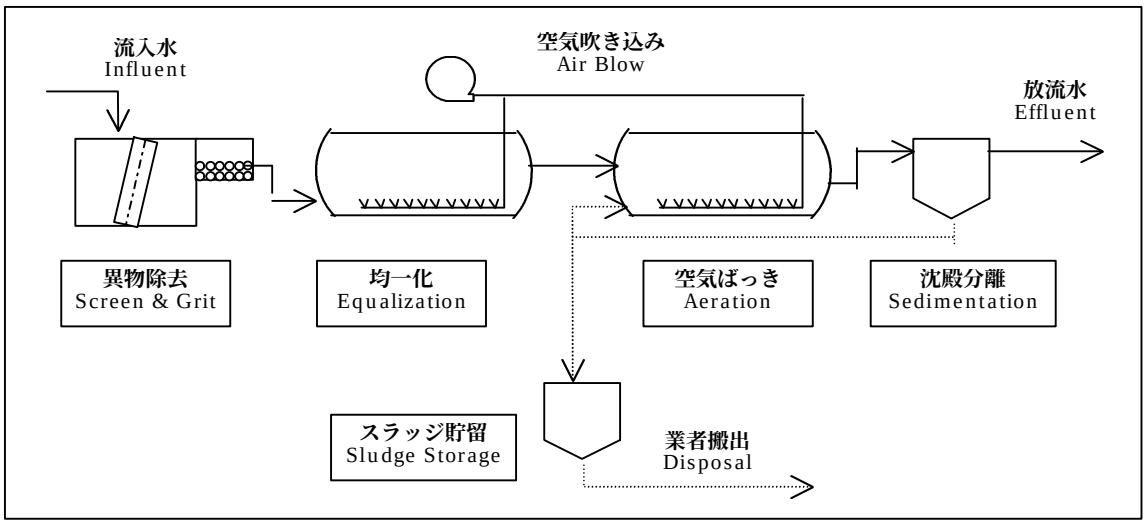
(Unit: mg/liter)

Item	Temperature, °C	pH	BOD	COD	SS	Oil & Grease
Standard	40	5.5 - 9.9	50	100	100	10.0

The company has decided to build a most advanced wastewater treatment plant as shown in Figure 2-4-8. The water received goes through a layer of grit and a screen to get rid of such foreign materials as plastic bags, and flows to a tank where water is aerated to be homogenized. Subsequently, water goes to another tank where biological treatment with aeration is conducted to decompose organic substances by microorganisms. On completion of the biological treatment water enters the sedimentation basin where the water is separated into clear supernatant water and sludge. The clear supernatant water is discharged to the public waters. Portion of the sludge settled in the sedimentation basin is recycled back to the biological treatment to be used for bio-decomposition. The amount of activated sludge in the aeration tank must always be kept constant. Therefore, this plant needs a trained operator to control the amount of sludge all the time. The excess sludge is kept in the sludge storage tank to be periodically taken away by a waste disposal company.

This design of plant features biological treatment in a closed tank. This wastewater treatment plant is less expensive than the one with a large concrete-made aeration basin for biological treatment. The exhaust gas from the activated treatment has an offensive smell. Use of a tank makes deodorization easier at the vent of the tank. This wastewater treatment plant seems capable to cope with the A standard. A local contractor estimates the cost of the plant at nearly 20 million yen under technical collaboration agreement with a Japanese equipment manufacturer for wastewater treatment.

Figure 2-4-8 Planned Wastewater Treatment Plant of Company M



b. Establishment of Environmental Management System

Company M started preparing for acquisition of ISO14001 certification in February 1998 and obtained the certification in August 1998. The company placed a Malaysian expert with experience in acquisition of certification in another Japanese company. With this Malaysian expert as the core of the activities, the company established the environmental management system, formulated the environmental policies and set the environmental objectives.

The plant mainly has assembling process, therefore, it does not discharge industrial wastewater, industrial exhaust gas or hazardous substances. Accordingly, the company found it difficult to identify suitable subjects for reduction of environmental impact. The environmental objectives include reduction of air pollutants by reducing traffic of trucks and turning off engines while engines are idling. On top of these, the company decided to add complying with the standards for household wastewater by introducing a most advanced wastewater treatment plant. Regarding general wastes, the company plans to reduce it by 5 % in 1999 from that of 1998. The company also intends to change the present system of washing the parts imported from Japan with substitute of CFC solvent to remove rust preventive oil to a new washing system. The company is now studying this subject with a facility vendor.

The Malaysian manager for ISO14001 promotion has pointed out problems, which appear unique for a Japanese company. These problems include insufficient awareness of the top and middle management on the issue of environmental management; insufficient understanding on the part of employees about the environmental management system, the practice of discarding wastes without sorting. The manager has presented some recommendations including: The president makes the middle management understand the importance of environmental consideration in a top-down initiative; the company should arrange tours to companies noted for good environmental management.

It is obvious that the Japanese companies have made contributions to Malaysian society in the area of human resource development when looking at the roles this Malaysian manager are playing in this company.

<Appendices>

Appendix 1
Environmental Quality Act 1974 (as of 1998)

Environmental Quality Act 1974（Act127）*

An Act relating to the prevention, abatement, control of pollution and enhancement of the environment, and for purposes connected therewith.

[15.4.1975]

BE IT ENACTED by the Duli Yang Maha Mulia Seri Paduka Baginda Yang di-Pertuan Agong with the advice and consent of the Dewas Negara and Dewas Rakayat in Parliament assembled, and by the authority of the same, as follows:

PART I PRELIMINARY

1. Short title, application and commencement.

(1) This Act may be cited as the Environmental Quality Act 1974 and shall apply to the whole of Malaysia.

(2) This Act shall come into force on such date as the Minister may appoint by a notification in the Gazette and the Minister may appoint different dates for the coming into force of different provisions of this Act and may bring all or any provisions thereof into force either in the whole of Malaysia to which the notification applies or such area as may be specified in the notification.

2. Interpretation.

In this Act, unless the context otherwise requires—

"aircraft" includes any kind of vehicle which may be used for the conveyance of passenger or goods by air;

"beneficial use" means a use of the environment or any element or segment of the environment that is conducive to public health, welfare or safety and which requires protection from the effects of wastes, discharges, emissions and deposits;

"Committee" means the Environmental Fund Committee established under section 36c;

"computer" means any device, identified by whatever name or description, for recording, storing, processing, retrieving or producing any information or matter, or for performing any one or more of those functions; and, where two or more computers carry out any one or more of those functions in combination, conjointly, or in succession, they shall be treated as a single computer;

"control equipment" includes—

(a) any apparatus for collecting wastes ;

(b) any automatic device used for securing the more efficient operation of any equipment;

(c) any device to indicate or record pollution or to give warning of excessive pollution; and

(d) any other device or facility used for the purpose of limiting pollution;

"Council" means the Environmental Quality Council established under section 4;

"Director General" means the Director General of Environ-mental Quality referred to in section 3;

"document" means any matter expressed described or represented in whatever manner, upon any substance, material, thing or article, including any matter embodied in a disc, tape, film, sound track or device, by means of—

(a) any letter, figure, mark, symbol, signal, sign, or any other form of expression, description or representation;

(b) a visual recording (whether of any still or moving image) ;

(c) a sound recording, or any electronic, magnetic, mechanical or other recording, or by any sound, electronic impulse or other data; or

(d) a recording, or transmission, over a distance of any matter by any, or any combination, of the means mentioned in paragraph (a), (b) or (c), or in this paragraph.

"element" in relation to the environment means any of the principal constituent parts of the environment including water, atmosphere, soil, vegetation, climate, sound, odour, aesthetics, fish and wildlife;

"environment" means the physical factors of the surroundings of the human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and the social factor of aesthetics;

"environmental audit" means a periodic, systematic, documented and objective evaluation to determine—

(a) the compliance status to environmental regulatory requirements ;

(b) the environmental management system; and

(c) the overall environmental risk of the premises;

"environmental management system" means a system comprising of an organizational structure with its responsibilities, practices, procedures, processes and resources for implementing and maintaining the system relating to the management of the environment;

"environmental risk" means any risk, hazard or chances of bad consequences that may be brought upon the environment;

"environmentally hazardous substances" means any natural or artificial substances including any raw material,

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* *As amended by Act A636, [w.e.f 10.1.86], A953 [w.e.f 1.8.96], AI030.*

whether in a solid, semi-solid or liquid form, or in the form of gas or vapour, or in a mixture of at least two of these substances, or any living organism intended for any environmental protection, conservation and control activity, which can cause pollution;

"Fund" means the Environmental Fund established under section 36_B;

"goods" includes environmentally hazardous substances, pollutants and wastes;

"industrial plant" means any plant used for the generation of power or for any industrial use or for the operation of ships, dredges, locomotives, cranes or other machines;

"inland waters" means any reservoir, pond, lake, river, stream, canal, drain, spring or well, or any part of the sea above the low water line along the coast, or any other body of natural or artificial surface or subsurface water;

"Malaysian waters" means the territorial waters of Malaysia as determined in accordance with the Emergency (Essential Powers) Ordinance, No. 7 1969;

"Minister" means the Minister charged with the responsibility for environment protection;

"mixture containing oil" means a mixture with such oil content as may be specified by the Minister or, if such oil content is not specified, a mixture with an oil content of one hundred parts or more in one million parts of the mixture;

"monitoring programme" means all actions taken and equipment used for the purpose of detecting or measuring quantitatively or quantitatively the presence, amount or level of any substance, characteristic or effect;

"occupier" means a person in occupation or control of—

(a) any premises; or

(b) in relation to premises where different parts of which are occupied by different persons, the respective persons in occupation or control of each part; or

(c) any vehicle, ship or aircraft;

"oil" means—

(a) crude oil, diesel oil, fuel oil and lubricating oil; and

(b) any other description of oil which may be prescribed by the Minister;

"owner" in relation to—

(a) any premises, means—

(i) the registered proprietor of the premises;

(ii) the lessee of a lease including a sub-lease of the premises, whether registered or otherwise;

(iii) the agent or trustee of any of the owners described in subparagraphs (i) and (ii) of this definition or where the owner as described in subparagraphs (i) and (ii) cannot be traced or has died, his legal personal representative; or

(iv) the person for the time being receiving the rent of the premises whether on his own account or as agent or trustee for any other person or as receiver or who would receive if the premises were let to a tenant;

(b) any ship, means-

(i) the person registered as the owner of the ship;

(ii) in the absence of registration, the person owning the ship;

(iii) in the case of a ship owned by any country and operated by a company which in that country is registered as the ship's operator, "owner" shall include the country; or

(iv) the agent or trustee of any of the owners described in subparagraphs (i), (ii) and (iii), or where the owner as described in subparagraphs (i) and (ii) cannot be traced or has died, his legal personal representative;

(c) any vehicle or aircraft, means the person registered as the owner of the vehicle or. aircraft;

"pollutants" means any natural or artificial substances, whether in a solid, semi-solid or liquid form, or in the form of gas or vapour, or in a mixture of at least two of these substances, or any objectionable odour or noise or heat emitted, discharged or deposited or is likely to be emitted, discharged or deposited from any source which can directly or indirectly cause pollution and includes any environmentally hazardous substances;

"pollution" means any direct or indirect alteration of the physical, thermal, chemical, or biological properties of any part of the environment by discharging, emitting, or depositing environmentally hazardous substances, pollutants or wastes so as to affect any beneficial use adversely, to cause a condition which is hazardous or potentially hazardous to public health, safety, or welfare, or to animals, birds, wildlife, fish or aquatic life, or to plants or to cause a contravention of any condition, limitation, or restriction to which a licence under this Act is subject;

"practicable" means reasonably practicable having regard, among other things, to local conditions and circumstances and to the current state of technical knowledge and the term "practicable means" includes the provision and the efficient maintenance of plant and the proper use thereof and the supervision by or on behalf of the occupier of any process or operation;

"premises" includes messuages, buildings, lands, and hereditaments of every tenure and any machinery or plant;

"prescribed" means prescribed by or under this Act or continued in operation by this Act;

"prescribed conveyance" means a vehicle or ship prescribed by the Minister under section 18 as a prescribed conveyance;

"prescribed premises" means any premises prescribed by the Minister under section 18;
"prescribed product" means any product prescribed by the Minister under paragraph 30A (1)(b);
"scheduled wastes" means any waste prescribed by the Minister in the regulations as scheduled wastes;
"segment" in relation to the environment means any portion or portions of the environment expressed in terms of volume, space, area, quantity, quality, or time or any combination thereof;
"ship" includes every description of vessel or craft or floating structure;
"soil" includes earth, sand, rock, shales, minerals and vegetation in the soil;
"trade" means any trade, business or undertaking whether ordinarily carried on at fixed premises or at varying places which results in the discharge of wastes and includes any activity prescribed to be a trade, business or undertaking for the purposes of this Act;
"transit" means the continuous passage from one border to another border through Malaysian territory and waters without storage ;
"vehicle" means a structure capable of moving or being moved or used for the conveyance of any person or thing and which maintains contact with the ground when in motion;
"waste" includes any matter prescribed to be scheduled waste, or any matter whether in a solid, semi-solid or liquid form, or in the form of gas or vapour which is emitted, discharged or deposited in the environment in such volume, composition or manner as to cause pollution.

PART II ADMINISTRATION

3. Director General and other officers.

(1) There shall be a Director General of Environmental Quality who shall be appointed by the Minister from amongst members of the public service and whose powers, duties and functions shall be—

(a) to administer this Act and any regulations and orders made thereunder;
(b) to be responsible for and to co-ordinate all activities relating to the discharge of wastes into the environment and for preventing or controlling pollution and protecting and enhancing the quality of the environment;
(c) the recommend to the Minister the environment protection policy and classifications for the protection of any portion of the environment or any segment of the environment with respect to the uses and values, whether tangible or intangible, to be protected, the quality to be maintained, the extent to which the discharge of wastes may be permitted without detriment to the quality of the environment, long range development uses and planning and any other factors relating to the protection and enhancement of the environment;
(d) to control by the issue of licenses the volume, types, constituents and effects of wastes, discharges, emissions, deposits or other sources of emission and substances which are of danger or a potential danger to the quality of the environment or any segment of the environment;
(e) to undertake surveys and investigations as to the causes, nature, extent of pollution and as to the methods of prevention of pollution and to assist and co-operate with other persons or bodies carrying out similar surveys or investigations;
(f) to conduct, promote and co-ordinate research in relation to any aspect of pollution or the prevention thereof and to develop criteria for the protection and enhancement of the environment;
(g) to recommend to the Minister standards and criteria for the protection of beneficial uses and the maintenance of the quality of the environment having regard to the ability of the environment to absorb waste without detriment to its quality and other characteristics;
(h) to co-opt any persons or bodies to form panels of experts whom he considers capable of assisting him in relation to special problems;
(i) to publish an annual report on environmental quality not later than 30th September of the following year and such other reports and information with respect to any aspect of environmental protection;
(j) to specify methods to be adopted in taking samples and making tests for the purposes of this Act;
(k) to undertake investigations and inspections to ensure compliance with this Act or the regulations made thereunder and to investigate complaints relating to breaches of this Act or the regulations made thereunder;
(l) to provide information and education to the public regarding the protection and enhancement of the environment;
(ll) to administer the Fund;
(m) to establish and maintain liaison and co-operation with each of the State Authorities in Malaysia and with other countries with respect to environment protection, pollution control and waste management;
(n) to report to the Minister upon matters concerning the protection and enhancement of the environment and upon any amendments he thinks desirable to any law affecting pollution and environment and upon any matters referred to him by the Minister; and
(o) to promote, encourage, co-ordinate and carry out planning in environmental management, waste management and pollution control.

(2) There shall be such number of Deputy Directors General of Environmental Quality and such other officers as may be necessary and expedient for the due administration of this Act who shall be appointed by the Minister from amongst members of the public service.
(3) The Minister may give to the Director General directions of a general character not inconsistent with this Act as to the exercise of the powers, duties and functions of the Director General under this Act and the Director General shall give effect to any directions so given.
(4) Unless excepted under any regulations made under this Act, any Deputy Director General and such other officer may exercise any powers, duties and functions of the Director General under this Act.

4. Establishment of the Environmental Quality Council.

(1) There is hereby established for the purposes of this Act a body by the name of the Environmental Quality Council whose functions shall be—
(a) generally to advise the Minister on matters pertaining to this Act; and
(b) to advise the Minister on any matter referred to it by the Minister.
(2) The Council shall consist of the following members—
(a) a Chairman who shall be appointed by the Minister;
(b) the Secretary General, Ministry of Science, Technology and the Environment or his authorized representative;
(c) the Secretary General, Ministry of International Trade and Industry or his authorized representative;
(cc) the Secretary General, Ministry of Domestic Trade and Consumer Affairs or his authorized representative;
(ccc) the Secretary General, Ministry of Agriculture or his authorized representative;
(d) the Secretary General, Ministry of Human Resources or his authorized representative;
(dd) the Secretary General, Ministry of Transport or his authorized representative;
(e) the Director General of Health or his authorized representative;
(f) one member each from Sabah and Sarawak; who shall be appointed by the Minister after consultation with the Governments of the States of Sabah and Sarawak;
(g) one member who shall be appointed by the Minister from among persons engaged in the petroleum industry;
(gg) one member who shall be appointed by the Minister from nominations by the oil palm industry;
(h) one member who shall be appointed by the Minister from nominations by the Federation of Malaysian Manufacturers or if such Federation no longer exist from among persons engaged in manufacture;
(hh) one member who shall be appointed by the Minister from nominations by the rubber industry;
(i) one member who shall be appointed by the Minister from among the academic staff of the Universities or Colleges in Malaysia;
(j) two members who shall be appointed by the Minister from among registered societies knowledgeable and having interests in matters pertaining to the environment.
(3) The Minister may in respect of each member appointed under paragraphs (f), (g), (gg), (h), (hh), (i) and (j) of subsection (2) appoint one person to be an alternate member to attend in place of the member at meetings of the Council if the member is for any reason unable to attend.
(4) When attending meetings of the Council an alternate member shall for all purposes be deemed to be a member of the Council.
(5) An alternate member shall, unless he sooner resigns or his appointment is sooner revoked, cease to be an alternate member when the member in respect of whom he is an alternate member ceases to be a member of the Council.

5. Duration of office and eligibility for re-appointment.

Every appointed member of the Council shall, unless he sooner resigns or his appointment revoked, hold office for a term not exceeding three years and shall be eligible for reappointment.

6. Disqualification, resignation and vacation from office.

(1) The following persons shall be disqualified from being appointed or being members of the Council—
(a) a person who is of unsound mind or is otherwise incapable of performing his duties;
(b) a person who has been found guilty of an offence involving fraud, dishonesty or moral turpitude; and
(c) a person who is a bankrupt or who has made an arrangement with his creditors.
(2) An appointed member of the Council shall be deemed to have vacated his office—
(a) upon his death;
(b) upon his resignation;
(c) upon his failure to attend three consecutive meetings of the Council without permission from the Minister; or
(d) if he becomes disqualified under subsection (1),
and a new member shall be appointed in his place in accordance with the provisions of this Act.

7. Calling of meetings, quorum, voting, procedure and minutes.

(1) The Council shall meet once during every four months of the year and shall, in addition, meet as and when convened by the Chairman.

(2) Eight members shall be a quorum at any of the meetings of the Council.
(3) If on any question to be determined by the Council there is an equality of votes, the Chairman or if the Chairman is absent the presiding member shall have a casting vote in addition to his deliberative vote.
(4) Subject to this Act, the Council shall determine its own procedure.
(5) Minutes shall be kept of all proceedings of the Council and copies thereof shall be submitted to the Minister.
(6) The Minister may invite or request a person, who is not a member of the Council, to attend any meeting of the Council for the purpose of advising it on a matter under discussion but the person so attending has no right to vote at the meeting.

8. Presiding officer at meetings of the Council.

(1) The Chairman of the Council shall preside at all meetings of the Council. '
(2) If, owing to absence or inability to act due to illness or any other cause, the Chairman of the Council is unable to preside at any meeting the members present shall elect one of their number to preside at that meeting.
(3) No business shall be transacted at any meeting of the Council in the absence of the Chairman until a member has been elected to preside over that meeting.

9. Remuneration.

Every appointed member may be paid a sum as may be determined by the Minister in respect of his attendance at a meeting of the Council.

PART III LICENCES

10. Licensing authority.

The Director General shall be the licencing authority.

11. Licences.

(1) An application for a licence or for any renewal or transfer thereof shall be made to the Director General in such form as may be prescribed and shall unless the Director General allows payment by instalments be accompanied by the prescribed fee.
(2) An applicant for a license or for the renewal or transfer thereof shall furnish in writing or otherwise such information as the Director General may consider necessary and relevant to the application.
(3) The Director General—

(a) may grant any application for a license or for a renewal or transfer thereof, either subject to conditions or unconditionally and where an application is granted subject to conditions, the conditions shall be specified in the license to which the application relates;
(b) may during the currency of a license revoke or vary any condition attached to the license or attach new conditions thereto whether in addition to or in substitution for existing conditions and shall notify the holder of the license of his action in that behalf; or
(c) shall not grant any application for a licence in respect of any premises the use whereof as such would contravene any town planning scheme, or any law respecting the use or development of land.

(4) The Director shall, before varying any condition attached to the licence or attaching new conditions thereto, take into consideration—

(a) whether it would be practicable to adapt the existing equipment, control equipment or industrial plant to conform with the varied or new condition;
(b) the economic life of the existing equipment, control equipment or industrial plant, having regard to the date of purchase;
(c) the quantity or degree of cut-back of emission, discharge or deposit of wastes to be achieved by the varied or new condition;
(d) the estimated cost to be incurred by the licensee to comply with the varied or new condition; and
(e) the nature and size of the trade, process or industry being carried out in the premises.

(5) In any case to which subsection (3) (c) applies, the application for the license shall be deemed to be finally determined by the refusal to grant the application, or if an appeal is made against the refusal, upon the determination of the appeal.

12. Power to attach conditions to licenses.

(1) Without affecting the generality of section 11, any condition attached to a license by the Director General—

(a) may require the holder of the license—
  (i) to repair, alter or replace any equipment in or on any premises specified in the license;
  (ii) to install and operate control equipment in or on any premises specified in the license;
  (iii) to repair, alter or replace any control equipment installed in or on any premises specified in the license;
  (iv) at his own expense, to conduct a monitoring programme designed to provide the Director General with information concerning the characteristics, quantity or effects of the emission, discharge or deposit in respect of which the licence is issued, which information recorded by such programme shall be supplied to the Director General at such time and in such manner as may be specified by the

Director General; or

(v) to carry out any of the requirements imposed on him under the foregoing provisions of this paragraph within such period as may be specified in the conditions; or

(b) may prohibit the holder of the licence from altering or replacing any control equipment installed in or on any premises specified in the licence except with the prior written permission of the Director General.

(2) Where under this Act a right of appeal is given against the decision of the Director General attaching a condition to a licence, any condition so attached has no force until the time limited for appealing against the condition has expired and, where an appeal against the condition has been duly made under this Act, until the hearing of the appeal confirms the decision of the Director General imposing the condition.

13. Duration and renewal of licences.

(1) A licence shall, unless otherwise specified in the licence or in any regulations made hereunder, remain in force for a period of one year from the date of its issue and may be renewed upon application made within the time stipulated hereunder.

(2) The holder of a licence who desires to obtain a renewal of the licence shall, at any time being not less than three months nor more than four months before the date of the expiration of the licence or of the subsisting renewal thereof, as the case may be, apply in such form as may be prescribed to the Director General for a renewal of the licence.

(3) Any person who fails to apply for renewal within the time specified in subsection (2) shall pay a late fee of one per centum of the licence fee or ten thousand ringgit whichever is the greater for every day of delay.

(4) Where any application for renewal is made after the expiry of the licence the Director General may refuse to renew same or may renew subject to an imposition of an expiry fee not exceeding five hundred per centum of the licence fee or ten thousand ringgit whichever is the greater.

(5) Where any application is made by post, the date on the postmark on the envelope shall be deemed to be the date on which the application was made and in cases where the Director General is unable to ascertain the date on the postmark, the application shall be deemed to have been made three days before the date on which such application was received by the Director General.

14. Transfer of licences.

Where the holder of a licence ceases to be the occupier of the premises specified in the licence the occupier of those premises may apply in such form as may be prescribed, accompanied by the prescribed fee, to the Director General for approval of the transfer to him of the licence in respect of those premises.

15. Register of licences.

There shall be kept such registers of licences as may be prescribed.

16. Licensee to comply with licence.

(1) The holder of a licence shall comply in every respect with the terms and conditions thereof.

(2) Any holder of a licence who contravenes subsection (I) shall be guilty of an offence and shall be liable to a fine not exceeding twenty-five thousand ringgit or to imprisonment for a period not exceeding two years or to both, and to a further fine of one thousand ringgit for every day that the offence is continued after a notice by the Director General requiring him to comply with such term or condition specified therein has been served upon him.

17. Licence fees.

(1) The Minister after consultation with the Council may prescribe the fees payable in respect of a licence, any transfer or renewal thereof .

(2) Different fees may be prescribed according to any one or more of the following factors-

(a) the class of premises;

(b) the location of such premises;

(c) the quantity of wastes discharged;

(d) the pollutant or class of pollutants discharged;

(e) the existing level of pollution.

(3) Where upon inspection it is ascertained that the pollutants or class of pollutants discharged, emitted or deposited is different from or the quantity of wastes discharged, emitted or deposited is greater than, that declared by the occupier in his application for or renewal of licence, the Director General may recover such fees as would have been payable in respect of that pollutant or class of pollutant or extra quantity of discharge, emission or deposit.

(4) In calculating the fees payable under subsection (3), the occupier shall be deemed to have discharged, emitted or deposited that pollutant or class of pollutants or that quantity of wastes for a period of six months preceding the inspection or, if the application for or renewal of licence was made less than before six months the inspection for the period beginning from the application up to the inspection.

(5) No additional fees shall be payable under subsections (3) and (4) if the additional sum payable is less than ten per centum of the fees paid by the occupier during the corresponding period.

PART IV PROHIBITION AND CONTROL OF POLLUTION

18. Prescribed premises to be licenced.

(1) The Minister after consultation with the Council may by order prescribe the premises (hereinafter referred to as

prescribed premises) the occupation or use of which by any person shall, unless he is the holder of a licence issued in respect of those premises, be an offence under this Act.

(1A) The Minister, after consultation with the Council, may by order prescribe the vehicle or ship used for the movement, transfer, placement or deposit of wastes (hereinafter referred to as prescribed conveyance) the use of which by any person shall, unless he is the holder of a licence issued in respect of the prescribed conveyance, be an offence under this Act.

(2) The provisions of subsection (1) do not apply to a person—

(a) who, on the date of the coming into operation of this Act, is the occupier of prescribed premises, and within the prescribed period after that date makes application for a licence in respect of those prescribed premises;

(b) who, where by virtue of any order made by the Minister from time to time amending any previously order made under this section, premises not previously prescribed premises become prescribed premises, is, consequent upon the order, the occupier of any prescribed premises, and who within the prescribed period after the publication of the order in the Gazette makes application for a licence in respect of those prescribed premises;

(c) who has made application for the transfer to him of a licence in respect of any prescribed premises and made the application within the prescribed period after he became the occupier of those prescribed premises, until his application has been finally determined.

(3) Any person found guilty of an offence under subsection (1) or (1_A) shall be liable to a fine not exceeding fifty thousand ringgit or imprisonment for a period not exceeding two years or to both and to a further fine of one thousand ringgit for every day that the offence is continued after a notice by the Director General requiring him to cease the act specified has been served upon him.

19. Prohibition against causing vehicle, ship or premises to become prescribed conveyance or prescribed premises.

No person shall—

(a) carry out any work on any vehicle, ship or premises that would cause the vehicle, ship or premises to become a prescribed conveyance or prescribed premises, as the case may be; or

(b) construct on any land any building designed for or used for a purpose that would cause the land or building to become prescribed premises,

without the prior written permission of the Director General.

20. Requirement and approval of plans.

(1) Every application to carry out any work, building, erection or alteration specified in section 19 shall be submitted to the Director General and shall be accompanied by—

(a) the plans and specifications of the proposed work, building, erection or alteration together with details of the control equipment if any to be installed;

(b) a lay-out plan indicating the site of the proposed work, building, erection or alteration which will take place in relation to the surrounding areas;

(c) the details of the trade, industry or process proposed to be carried on in such premises;

(d) descriptions of waste constituents and characteristics; and

(e) such other information which the Director General may require,

and the applicant shall pay the prescribed fee.

(2) The Director General may grant such application either subject to conditions or unconditionally and may require the licensee to provide and bear the cost of the control equipment and of a satisfactory monitoring programme:

Provided that no application shall be granted unless the applicant has obtained planning approval from the competent planning authority .

21. Power to specify conditions of emission, discharge, etc.

The Minister, after consultation with the Council, may specify the acceptable conditions for the emission, discharge or deposit of environmentally hazardous substances, pollutants or wastes or the emission of noise into any area, segment or element of the environment and may set aside any area, segment or element of the environment within which the emission, discharge or deposit is prohibited or restricted.

22. Restrictions on pollution of the atmosphere.

(1) No person shall, unless licenced, emit or discharge any environmentally hazardous substances, pollutants or wastes into the atmosphere in contravention of the acceptable conditions specified under section 21.

(2) Without limiting the generality of subsection (1), a person shall be deemed to emit or discharge wastes into the atmosphere if—

(a) he places any matter in a place where it may be released into the atmosphere;

(b) he causes or permits the discharge of odours which by virtue of their nature, concentration, volume or extent are obnoxious or offensive;

(c) he burns any wastes of the trade, process or industry; or

(d) he uses any fuel burning equipment not equipped with any device or control equipment required to be fitted to such equipment.

(3) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding one hundred thousand ringgit or to imprisonment for a period not exceeding five years or to both and to a further fine not exceeding one thousand ringgit a day for every day that the offence is continued after a notice by the Director General requiring him to cease the act specified therein has been served upon him.

23. Restrictions on noise pollution.

(1) No person shall, unless licenced, emit or cause or permit to be emitted any noise greater in volume, intensity or quality in contravention of the acceptable conditions specified under section 21.

(2) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding one hundred thousand ringgit or to imprisonment for a period not exceeding five years or to both and to a further fine not exceeding five hundred ringgit a day for every day that the offence is continued after a notice by the Director General requiring him to cease the act specified therein has been served upon him.

24. Restrictions on pollution of the soil.

(1) No person shall, unless licenced, pollute or cause or permit to be polluted any soil or surface of any land in contravention of the acceptable conditions specified under section 21.

(2) Notwithstanding the generality of subsection (1). a person shall be deemed to pollute any soil or surface of any land if—

(a) he places in or on any soil or in any place where it may gain access to any soil any matter whether liquid, solid or gaseous; or

(b) he establishes on any land a refuse dump, garbage tip, soil and rock disposal site, sludge deposit site, waste-injection well or otherwise used land for the disposal of or a repository for solid or liquid wastes so as to be obnoxious or offensive to human beings or interfere with underground water or be detrimental to any beneficial use of the soil or the surface of the land.

(3) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding one hundred thousand ringgit or to imprisonment for a period not exceeding five years or to both and to a further fine not exceeding one thousand ringgit a day for every day that the offence is continued after a notice by the Director General requiring him to cease the act specified therein has been served upon him.

25. Restrictions on pollution of inland waters.

(1) No person shall, unless licenced, emit, discharge or deposit any environmentally hazardous substances, pollutants or wastes into any inland waters in contravention of the acceptable conditions specified under section 21.

(2) Without limiting the generality of subsection (1), a person shall be deemed to emit, discharge or deposit wastes into inland waters if—

(a) he places any wastes in or on any waters or in a place where it may gain access to any waters;

(b) he places any waste in a position where it falls, descends, drains, evaporates, is washed, is blown or percolates or is likely to fall, descend, drain, evaporate or be washed, be blown or percolated into any waters, or knowingly or through his negligence, whether directly or indirectly, causes or permits any wastes to be placed in such a position; or

(c) he causes the temperature of the receiving waters to be raised or lowered by more than the prescribed limits.

(3) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding one hundred thousand ringgit or to imprisonment for a period not exceeding five years or to both and to a further fine not exceeding one thousand ringgit a day for every day that the offence is continued after a notice by the Director General requiring him to cease the act specified therein has been served upon him.

26. *(Deleted by Act A636)*.

27. Prohibition of discharge of oil into Malaysian waters.

(1) No person shall, unless licensed, discharge or spill any oil or mixture containing oil into Malaysian waters in contravention of the acceptable conditions specified under section 2 1 .

(2) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding five hundred thousand ringgit or to imprisonment not exceeding five years or to both.

28. Special defences.

Where any person is charged for any offence under section 27 it shall be a defence to prove that such discharge or spillage was—

(a) for the purpose of securing the safety of the vessel;

(b) for the purpose of saving human life;

(c) the result of damage to the vessel and that all reasonable steps were taken to prevent, to stop or to reduce the spillage;

(d) the result of a leakage, which was not due to want of care, and that all reasonable steps have been taken to stop or reduce the leakage; or

(e) the result of an effluent produced by operation for the refining of oil, and that all reasonable steps had been taken to eliminate oil from the effluent and that it was not reasonably practicable to dispose of the effluent otherwise than by discharging or spilling it into the Malaysian waters.

29. Prohibition of discharge of wastes into Malaysian waters.

(1) No person shall, unless licensed, discharge environmentally hazardous substances, pollutants or wastes into the Malaysian waters in contravention of the acceptable conditions specified under section 21.

(2) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding five hundred thousand ringgit or to imprisonment not exceeding five years or to both.

29A. Prohibition on open burning. [Ins. Act A 1030]

(1) Notwithstanding anything to the contrary contained in this Act, no person shall allow or cause open burning on any premises.

(2) Any person who contravenes subsection (1) shall be guilty of an offence and shall, on conviction, be liable to a fine not exceeding five hundred thousand ringgit or to imprisonment for a term not exceeding five years or to both.

(3) For the purposes of subsection (1)—

"open burning" means any fire, combustion or smouldering that occurs in the open air and which is not directed there through a chimney or stack, but does not include any fire, combustion or smouldering that occurs for such activities as may be prescribed by the Minister by order published in the *Gazette*;

"premises" includes any land.

29B. Owner or occupier of premises liable for open burning.

If open burning occurs on any premises—

(a) the owner; or

(b) the occupier,

of the premises who has control over such premises shall be deemed to have contravened subsection 29A(1) unless the contrary is proved.

29 C. Defence.

In any prosecution under section 29A or 29B, it shall be a defence if the person, owner or occupier of the premises proves—

(a) that the open burning occurred outside his control or without his knowledge or connivance or consent; or

(b) that he—

(i) took all reasonable precautions; or

(ii) exercised all due diligence, to prevent the commissi9n of the offence as he ought to have taken and exercised having regard to the nature of his responsibility in that capacity and to all the circumstances.

30. Power to prohibit use of any material or equipment.

The Minister after consultation with the Council may by order published in the *Gazette*—

(a) prohibit the use of any materials for any process, trade or industry ;

(b) prohibit whether by description or by brand name the use of any equipment or industrial plant, within the areas specified in the order.

30A. Power to control use of substance and product and to state environmental labelling.

(1) The Minister, after consultation with the Council, may by order published in the *Gazette*—

(a) prescribe any substance as an environmentally hazardous substance which requires the substance to be reduced, recycled, recovered or regulated in the manner as specified in the order; and

(b) prescribe any product as a prescribed product for sale and that the product shall contain a minimum percentage of recycled substances and to carry an appropriate declaration on its recycled constituents, method of manufacture and disposal.

(2) Any order made under subsection (I) may specify rules on the use, design and application of the label in connection with the sale of the substance or product which claims to be environmentally friendly .

(3) Any person who fails or refuses to comply with the order made under subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding fifty thousand ringgit or to imprisonment for a period not exceeding five years or to both.

30B. Power to specify rules on deposit and rebate schemes.

The Minister, after consultation with the Council, may specify the guide-lines and procedures on deposit and rebate schemes in connection with the disposal of products that are considered-

(a) environmentally unfriendly; or

(b) causing adverse constraint on the environment,

for the purpose of collecting the products efficiently in order to ensure that the recycling or disposal of the products is done in an environmentally sound manner.

31. Power to require owner or occupier to install, operate, repair, etc.

(1) Where any environmentally hazardous substances, pollutants or wastes are being or are likely to be emitted, discharged or deposited from any vehicle, ship or premises irrespective of whether the vehicle, ship or premises are prescribed under section 18 or otherwise, or from any aircraft, the Director General may by notice in writing require the owner or occupier of the vehicle, ship or premises, or aircraft, to—

(a) install and operate any control equipment or additional control equipment;

(b) repair, alter or replace any equipment or control equipment;

(c) erect or increase the height of any chimney;

(d) measure, take a sample of, analyse, record and report any environmentally hazardous substances, pollutants, wastes, effluents or emissions containing pollutants ;

(e) conduct a study on any environmental risk;

(f) install, maintain and operate monitoring programme at the expense of the owner or occupier; or

(g) adopt any measure to reduce, mitigate, disperse, remove, eliminate, destroy or dispose of pollution,

within such time and in such manner as may be specified in the notice.

(2) Notwithstanding any other provisions to the contrary, the Director General may by notice direct the owner or occupier of any vehicle, ship, or premises, or aircraft to emit, discharge or deposit environmentally hazardous substances, pollutants or wastes during such periods of day as he may specify and may generally direct the manner in which the owner or occupier shall carry out his trade, industry or process or operate any equipment, industrial plant or control equipment therein.

(3) Any person who contravenes the notice issued under subsection (1) or (2) shall be guilty of an offence and shall be liable to a fine not exceeding twenty-five thousand ringgit or to imprisonment for a period not exceeding two years or to both and to a further fine not exceeding one thousand ringgit a day for every day that the offence is continued after service on him of the notice specified in subsection (1) or (2).

31A. Prohibition order, etc.

(1) The Minister, after consultation with the Council, may by order published in the Gazette specify the circumstances whereby the Director General may issue . a prohibition order to the owner or occupier of any industrial plant or process to prevent its continued operation and release of environmentally hazardous substances, pollutants or wastes either absolutely or conditionally, or for such period as he may direct, or until requirements to make remedy as directed by him have been complied with.

(2) The Minister, in circumstances where he considers that the environment, public health or safety is under or likely to be under serious threat, may direct the Director General—

(a) to issue an order requiring a person to cease all acts that have resulted in the release of environmentally hazardous substances, pollutants or wastes; and

(b) to effect and render any machinery, equipment, plant or process of the person inoperable.

(3) Any person who contravenes subsection (1) or (2) shall be guilty of an offence and shall be liable to a fine not exceeding fifty thousand ringgit or to imprisonment for a period not exceeding two years or to both.

32. Owner or occupier to maintain and operate equipment. .

The owner or occupier of any vehicle, ship or premises irrespective of whether the vehicle, ship or premises are prescribed under section 18 or otherwise, or aircraft shall maintain any equipment or control equipment installed on the vehicle, ship or premises, or aircraft in good condition and shall operate the equipment or control equipment in a proper and efficient manner.

33. Power to prohibit or control licenced persons from discharging, etc. of wastes in certain circumstances.

(1) Where several persons are licensed under this Act to emit, discharge or deposit environmentally hazardous substances, pollutants or wastes into the same segment or element of environment and appears to the Director General that each of such persons is complying with the conditions of the licence but nevertheless the collective effect of the aggregate of such wastes is likely to cause a worsening of condition in that segment or element of the environment such as to affect the health, welfare or safety of human beings, or to threaten the existence of any animals, birds wildlife fish or other aquatic life, the Director General may, by notice serve on each of the licensees, requiring each of them to abate such emission, discharge or deposit in the manner and within the period specified in the notice.

(2) Any person who contravenes the notice issued under subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding fifty thousand ringgit or to imprisonment not exceeding five years or to both and to a further fine not exceeding one thousand ringgit a day for every day that the offence is continued after service on him of the notice specified in subsection (1).

33A. Environmental audit.

(1) The Director General may require the owner or occupier of any vehicle, ship or premises, irrespective of whether the vehicle, ship or premises are prescribed under section I 8 or otherwise, to carry out an environmental audit and to submit an audit report in the manner as may be prescribed by the Minister by regulations made under this Act.

(2) For the purpose of carrying out an environmental audit and to submit a report thereof, the owner or occupier so directed shall appoint qualified personnel who are registered under subsection (3).

(3) For the purpose of this section, the Director General shall maintain a list of qualified personnel who may carry out any environmental audit and submit a report thereof.

34. Exemptions.

If the Director General is satisfied on the application of any person interested that it is expedient to do so for the purpose of enabling investigation or research relevant to the problem of pollution to be carried out without rendering the applicant liable to proceedings under this Act or the regulations made thereunder, the Director General may by notice in writing to the applicant exempt wholly or to a limited extent any premises or any equipment or industrial plant subject to such conditions and for such period as may be specified in the notice.

34A. Report on impact on environment resulting from prescribed activities.

(1) The Minister, after consultation with the Council, may by order prescribe any activity which may have significant

environmental impact as prescribed activity.
(2) Any person intending to carry out any of the prescribed activities shall, before any approval for the carrying out of such activity is granted by the relevant approving authority, submit a report to the Director General. The report shall be in accordance with the guidelines prescribed by the Director General and shall contain an assessment of the impact such activity will have or is likely to have on the environment and the proposed measures that shall be undertaken to prevent, reduce or control the adverse impact on the environment.
(3) If the Director General on examining the report and after making such inquiries as he considers necessary, is of the opinion that the report satisfies the requirements of subsection (2) and that the measures to be undertaken to prevent, reduce or control the adverse impact on the environment are adequate, he shall approve the report, with or without conditions attached thereto, and shall inform the person intending to carry out the prescribed activity and the relevant approving authorities accordingly.
(4) If the Director General, on examining the report and after making such inquiries as he considers necessary, is of the opinion that the report does not satisfy the requirements of subsection (2) or that the measures to be undertaken to prevent, reduce or control the adverse impact on the environment are inadequate, he shall not approve the report and shall give his reasons therefor and shall inform the person intending to carry out the prescribed activity and the relevant approving authorities accordingly:
Provided that where such report is not approved it shall not preclude such person from revising and resubmitting the revised report to the Director General for his approval.
(5) The Director General may if he considers it necessary require more than one report to be submitted to him for his approval.
(6) Any person intending to carry out a prescribed activity shall not carry out such activity until the report required under this section to be submitted to the Director General has been submitted and approved.
(7) If the Director General approves the report, the person carrying out the prescribed activity, in the course of carrying out such activity, shall provide sufficient proof that the conditions attached to the report (if any) are being complied with and that the proposed measures to be taken to prevent, reduce or control the adverse impact on the environment are being incorporated into the design, construction and operation of the prescribed activity.
(8) Any person who contravenes this section shall be guilty of an offence and shall be liable to a fine not exceeding one hundred thousand ringgit or to imprisonment for a period not exceeding five years or to both and to a further fine of one thousand ringgit for every day that the offence is continued after a notice by the Director General requiring him to comply with the act specified therein has been served upon him.

PART IV A CONTROL OF SCHEDULED WASTES

34B. Prohibition against placing, deposit, etc. of scheduled wastes.
(1) No person shall—
(a) place, deposit or dispose of, or cause or permit to place, deposit or dispose of, except at prescribed premises only, any scheduled wastes on land or into Malaysian waters;
(b) receive or send, or cause or permit to be received or sent any scheduled wastes in or out of Malaysia; or
(c) transit or cause or permit the transit of scheduled wastes,
without any prior written approval of the Director General.
(2) The Director General may grant the written approval either subject to conditions or unconditionally.
(3) For the purpose of this Act, any act of receiving or sending, or transit of any scheduled wastes with an approval obtained through falsification, misrepresentation or fraud or which does not conform in a material way with the relevant documents in such form as may be prescribed, shall be an offence.
(4) Any person who contravenes this section shall be guilty of an offence and shall be liable to a fine not exceeding five hundred thousand ringgit or to imprisonment for a period not exceeding five years or to both.

PART V APPEAL AND APPEAL BOARD

35. Appeal.
(1) Any person who is aggrieved by—
(a) a refusal to grant a licence or transfer of a licence;
(b) the imposition of any condition, limitation or restriction on his licence;
(c) the revocation, suspension or variation of his licence;
(d) the amount which he would be required to pay under section 47;
(e) any decision of the Director General under subsection (3) or (4) of section 34A; and
(f) any decision of the Director General or any officer under subsection (2) or (5) of section 48A,
may within such time and in such manner as may be prescribed, appeal to the Appeal Board.
(2) The Appeal Board may after hearing the Director General and the appellants make such order as it deems fit.
36. Appeal Board.
(1) For the purpose of this Act there shall be appointed an Appeal Board consisting of three members, one of whom

shall be the Chairman (hereafter in this section referred to as the Chairman).
(2) There shall also be a Deputy Chairman of the Appeal Board (hereafter in this section referred to as a Deputy Chairman) who shall only serve in the Appeal Board if the Chairman is unable to exercise his functions owing to illness, absence from the Federation or for any other cause whatsoever; and when the Deputy Chairman is to serve in the Appeal Board under the aforesaid circumstances he shall exercise the functions of the Chairman.
(3) The Chairman and the Deputy Chairman shall be persons nominated by the Chief Justice from amongst persons who for the seven years preceding the nomination have been advocates and solicitors of the High Courts in Malaysia or have been members of the judicial and legal service of the Federation and who shall be appointed by a notification in the Gazette by the Minister for a period not exceeding three years; and any person so appointed shall be eligible for reappointment.
(4) (a) The Chairman may call upon to serve on the Appeal Board any two members from a panel of persons appointed by notification in the Gazette by the Minister.
(b) The appointment of any member, other than the Chairman and the Deputy Chairman shall be for a period of three years unless he sooner resigns or his appointment is sooner revoked.
(5) The Minister may revoke the appointment of the Chairman or Deputy Chairman or the appointment of the other members without assigning any reason therefor.
(6) A member of the Appeal Board having an interest in any matter before the Board shall disclose to the Appeal Board the fact of his interest and the nature thereof, and such disclosure shall be recorded and such member shall take no part in any proceedings of the Appeal Board relating to such matter.
(7) Every decision of the Appeal Board shall be made by the Chairman of the Appeal Board after considering the opinion of the other two members but in making his decision the Chairman shall not be bound to conform to the opinion of the other two members or either of them provided that the Chairman shall record his reasons for dissenting therefrom.
(8) In addition to all the powers granted to the Appeal Board under this Act the Appeal Board shall also have power to award costs pr make any order in respect of an appeal before it.
(9) The rules of procedure for the hearing of appeal under this Act shall follow insofar as applicable, the Subordinate Courts Rules and the Chairman shall keep a record of such hearing.
(10) A member shall be entitled to such remuneration or allowances as may be determined by the Minister.

PART V A PAYMENT OF CESS AND ENVIRONMENTAL FUND

36A. Research cess.
(1) For the purpose of conducting, promoting or coordinating research in relation to any aspect of pollution or the prevention thereof, the Minister, after consultation with the Minister of Finance and the Council, may make an order for the imposition and collection, or variation or cancellation of an imposition, of a cess on the waste generated.
(2) Any order made under subsection (1) may provide—
(a) for different rates of cess to be imposed in respect of the different types of waste generated including the volume and composition of waste;
(b) for the manner of collection of the cess by the Director General; and
(c) for the exemption of any person or class of persons, or in respect of any waste generated other than for research purposes, from payment of the cess.
(3) The cess collected under this section shall be paid into the Fund established under section 36_B.
36B. Establishment of Environmental Fund.
(1) There shall be established a fund to be known as the Environmental Fund which shall be operated as a Trust Account within the Federal Consolidated Fund.
(2) The Fund shall consist of—
(a) such sums of money as may be provided from time to time by the Government;
(b) all donations and contributions received from within or outside Malaysia;
(c) all moneys paid to or received by the Director General from the cess imposed or collected in accordance with section 36A; and
(d) all moneys paid or received in accordance with section 36D.
36C. Environmental Fund Committee.
(1) There shall be established a committee to be known as the Environmental Fund Committee which shall have control of the Fund.
(2) The Committee shall consist of the following members:
(a) the Director General who shall be the Chairman;
(b) two Senior Environmental Officers to be appointed by the Minister; and
(c) two public officers to be appointed by the Minister.
(3) No meeting of the Committee shall be held in the absence of the Director General.
(4) The quorum for a meeting of the Committee shall be three persons.
(5) Subject to this Act, the Committee may determine its own proceedings.
36D. Contribution into the Fund.

The Minister, after consultation with the Council, may require any person engaged in—

(a) the exploration, extraction, refining, production, bulk movement, distribution or storage, of oil;

(b) the production, bulk movement, distribution or storage, of environmentally hazardous substances; or

(c) the bulk movement or storage, of waste,

to contribute to the Fund at a rate that he may specify.

36E. Application of the Fund.

The Fund shall be administered for the purpose of—

(a) conducting, promoting and coordinating research in relation to any aspect of pollution or the prevention thereof;

(b) recovering of waste, or removing, dispersing, destroying, cleaning, disposing of or mitigating pollution;

(c) preventing or combatting the following occurrences:

(i) a spillage, discharge or dumping of oil;

(ii) a discharge, deposit or dumping, of environmentally hazardous substances; or

(iii) a discharge, deposit or dumping, of waste; and

(d) encouraging conservation measures against any damage that may be caused by any of the occurrences spelt out under subparagraph (i), (ii) or (iii) of paragraph (c).

PART VI MISCELLANEOUS

37. Owner or occupier to furnish information.

(1) The Director General may by notice require the owner or occupier of any vehicle, ship, premises or aircraft to furnish to him within the period as may be specified in the notice information relating to—

(a) the ownership of the vehicle, ship, premises or aircraft;

(b) the use of raw materials, environmentally hazardous substances, or any process, equipment, control equipment or industrial plant found on the vehicle, ship, premises or aircraft;

(c) any environmentally hazardous substances, pollutants or wastes discharged or likely to be discharged therefrom; or

(d) any environmental risk that is likely to result from the use of the raw materials, environmentally hazardous substances or process.

(2) Any person who, when required by the Director General to answer any question or to furnish any information, fails to answer such question or to furnish such information as is required or gives any answer or information that is false or misleading in any material respect shall be guilty of an offence and shall be liable to a fine not exceeding two thousand ringgit or to imprisonment not exceeding six months or to both.

38. Power to stop, board, search, etc.

(1) Where the Director General or any officer duly authorized in writing by him is satisfied, or has reason to believe that any person has committed an offence under this Act, he may, if in his opinion it is necessary to do so for the purpose of investigating the offence, without a warrant, stop, board and search any vehicle, ship or aircraft, or enter any premises, irrespective of whether the vehicle, ship or premises are prescribed under section 18 or otherwise, and may—

(a) inspect, examine, seize or detain any equipment, computer, or industrial plant;

(b) inspect, examine, seize or detain any book, record, licence, permit, certificate or document relating to —

(i) the performance or use of the equipment or industrial plant;

(ii) environmentally hazardous substances, pollutants or wastes; or

(iii) any matter required to be carried on board a vehicle, ship or aircraft under this Act or under any other written law;

(c) inspect, examine, seize or detain any scheduled wastes or environmentally hazardous substances and any vehicle or ship used in the conveyance of the scheduled wastes or environmentally hazardous substances;

(d) make such enquiries and physical inspection of the ship, equipment, gear, stores and cargo as may be necessary;

(e) make copies of, or take extracts from, any book, record or documents so seized and detained;

(f) inspect, examine or take a sample of any substance, material or matter used, or which is likely to be used or usually used in any trade, industry or process carried on in or on the vehicle, ship, premises, or aircraft; or

(g) take a sample of any environmentally hazardous substances, pollutants or wastes that are emitted, discharged or deposited, or are likely to be emitted, discharged or deposited from the vehicle, ship, premises, or aircraft.

38A. Power to examine person acquainted with case.

(1) The Director General or any officer duly authorized in writing by him in carrying out an investigation under this

Act may examine orally any person supposed to be acquainted with the facts and circumstances of the case and shall reduce into writing any statement made by the person so examined.

(2) The person referred to in subsection (1) shall be bound to answer all questions relating to the case put to him by the Director General or any officer duly authorized in writing by him:

Provided that the person may refuse to answer any question the answer to which would have a tendency to expose him to a criminal charge, penalty or forfeiture.

(3) A person making a statement under this section shall be legally bound to state the truth, whether or not the statement is made wholly or partly in answer to questions.

(4) The Director General, or any officer duly authorized in writing by him, in examining a person under subsection (1) shall first inform the person of the provisions of subsections (2) and (3).

(5) A statement made by a person under this section shall, whenever possible, be reduced into writing and signed by the person making it or affixed with his thumb-print, as the case may be, after it has been read to him in the language in which he made it and after he has been given an opportunity to make any corrections he may wish, and where the person examined refuses to sign or affix his thumb-print on the statement, the Director General or any officer duly authorized in writing by him shall endorse thereon under his hand the fact of the refusal and the reason for it, if any, as stated by the person examined.

39. Service of notices.

(1) Every notice, order, summons or document required or authorized by this Act or any regulations made thereunder to be served on any person may be served—

(a) by delivering the same to such person or by delivering the same to some adult member or servant of his family;

(b) by leaving the same at the usual or last known place of abode or business of such person in a cover addressed to such person; or

(c) by forwarding the same by registered post in a prepaid cover addressed to such person at his usual or last known place of abode or business.

(2) A notice, order, summons or document required or authorized by this Act or any regulations made thereunder to be served on the owner or occupier of any premises shall be deemed to be properly addressed if addressed by the description of the "owner" or "occupier" of such premises without further name or description.

(3) A notice, order, summons or document required or authorized by this Act or any regulations made thereunder to be served on the owner or occupier of any premises may be served by delivering the same or a true copy thereof to some adult person on the premises or, if there is no such person on the premises to whom the same can with reasonable diligence be delivered, by affixing the notice, order, summons, or document to some conspicuous part of the premises.

40. Evidence.

(1) The contents of any document prepared, issued or served under, by virtue of or for the purposes of this Act shall until the contrary is proved be presumed to be correct and the production of any book purporting to show the licences issued under this Act shall be prima facie proof of the issue, lack of issue or date of expiry of such licences.

(2) Notwithstanding any other laws to the contrary, in any proceedings under this Act or the regulations made thereunder a certificate for the purpose of establishing the occupier of any premises or prescribed premises as the case may be which purports to be signed by the Collector of Land Revenue shall unless the contrary is proved be evidence of any facts stated therein.

(3) In any proceeding for offences against this Act or the regulations made thereunder where it is necessary to prove that any person was or was not licenced on a certain date or for a certain period or that a licence was subject to any specified condition, limitation or restriction or that a licence was suspended during a certain period a certificate in writing purporting to be signed by the Director General setting out that such person was or was not licenced on that date or any condition, limitation or restriction to which a licence issued to such person is subject or for or during that period or that the licence of such person was suspended during such period shall be *prima facie* evidence of the facts stated therein and the Director General shall not be cross-examined on the contents of such certificate unless he has been served with ten days' notice stating the intention to do so and further stating the particulars which are intended to be challenged.

41. Penalty for offences not otherwise provided for.

Every omission or neglect to comply with, and every act done or attempted to be done contrary to, the provisions of this Act or any regulations made thereunder or any breach of the conditions and restrictions subject to, or upon which, any licence is issued under this Act or any regulations made thereunder shall be an offence against this Act and in respect of any such offence for which no penalty is expressly provided the offender shall be liable to a fine not exceeding ten thousand ringgit or to imprisonment not exceeding two years or to both.

42. Attempts and abetments.

Whoever attempts to commit any offence punishable under this Act or any regulations made thereunder or abets the commission of such offence, shall be punished with the punishment provided for such offence.

43. Offences by bodies of persons and by servants and agents.

(1) Where an offence against this Act or any regulations made thereunder has been committed by a company, firm, society or other body of persons, any person who at the time of the commission of the offence was a director, manager,

or other similar officer or a partner of the company, firm, society or other body of persons or was purporting to act in such capacity shall be deemed to be guilty of that offence unless he proves that the offence was committed without his consent or connivance and that he has exercised all such diligence as to prevent the commission of the offence as he ought to have exercised, having regard to the nature of his functions in that capacity and to all the circumstances.

(2) Whenever it is proved to the satisfaction of the court that a contravention of the provisions of this Act or any regulations made thereunder has been committed by any clerk, servant or agent when acting in the course of his employment the principal shall also be held liable for such contravention and to the penalty provided thereof unless he proves to the satisfaction of the court that the same was committed without his knowledge or consent or that he had exercised all such diligence as to prevent the same and to ensure the observance of such provisions:

Provided that nothing in this section shall be deemed to exempt such clerk, servant or agent from liability in respect of any penalty provided by this Act or regulations made thereunder for any contravention proved to have been committed by him.

44. Prosecution.

No prosecution shall be instituted for an offence under this Act or the regulations made thereunder without the consent in writing of the Public Prosecutor.

45. Compounding of offences.

(1) The Director General or any Deputy Director General, or any other public officer or any local authority to whom the Director General has delegated such power in writing, may compound any offence under this Act or the regulations made thereunder which is prescribed by the Minister to be a compoundable offence by accepting from the person reasonably suspected of having committed the offence a sum of money not exceeding two thousand ringgit.

(2) The Minister may make rules to prescribe the method and procedure for compounding such offences.

46. Sessions Court and Court of a Magistrate of the First Class to have jurisdiction.

Notwithstanding any written law to the contrary, a Sessions Court in West Malaysia or a Court of a Magistrate of the First Class in East Malaysia shall have jurisdiction to try any offence under this Act and to award the full punishment for any such offence.

46A. Power to seize vehicle or ship.

Any vehicle or ship that is used in the transportation of or the disposal of waste in contravention of this Act or any regulations made thereunder may be seized by the Director General pending the outcome of any proceedings under this Act:

Provided that the Director General may release the vehicle or ship so seized upon the furnishing of a bond or other security that is adequate to cover the value of the vehicle or ship.

46B. Power of forfeiture and disposal.

Where it is proven to the satisfaction of the court that the vehicle or ship seized under this Act is used in the commission of an offence, the court shall order that the vehicle or ship be forfeited and disposed of in the manner as the court may direct.

46C. Seizure and forfeiture of vehicle or ship.

(1) Where any vehicle or ship is seized under this Act and there is no prosecution within one month from the date of seizure in respect of the matter, the vehicle or ship shall be deemed to be forfeited at the end of that period unless before that date a written claim on it is made in the manner set out in subsections (2), (3) and (4).

(2) Any person asserting that he is the owner of the vehicle or ship referred to in subsection (1) and that it is not liable to forfeiture may personally or by his agent authorized in writing give a written notice to the officer duly authorized in writing by the Director General in whose possession the vehicle or ship is held that he is making a claim on the vehicle or ship.

(3) On receipt of the notice referred to in subsection (2) the officer duly authorized in writing by the Director General shall refer the claim to the Director General who shall direct such officer to refer the matter to a Sessions Court Judge for a decision.

(4) The Sessions Court Judge to whom the matter is referred under subsection (3) shall issue a summons requiring the person asserting that he is the owner of the vehicle or ship, and the person from whom it was seized, to appear before the Sessions Court Judge, and upon their appearance or default to appear, due service of the summons being proved, the Sessions Court Judge shall proceed to the examination of the matter and on proof that an offence under this Act has been committed and that the vehicle or ship was the subject matter of or was used in the commission of the offence shall order the vehicle or ship to be forfeited and shall, in the absence of such proof, order its release.

(5) Any vehicle or ship deemed to be forfeited or forfeited under this section shall be delivered to the Director General and shall be disposed of by the Director General—

(a) in accordance with the directions given by the Sessions Court Judge; or

(b) in the manner as he deems fit.

46D. No costs or damages arising from seizure unless seizure made without reasonable cause.

In any proceedings before any court in respect of any vehicle or ship seized in the exercise of any power conferred under this Act, a person shall not be entitled to the costs of the proceedings or to any damages or other relief other than an order for the return of the vehicle or ship seized or the payment of its value unless the seizure was made without reasonable cause.

$46E_E$. Compensation for loss or damage to property.

After a person has been convicted for an offence against this Act or any regulations made thereunder, the court, in addition to imposing a penalty for the offence, may, where it appears to the court that any other person has, by reason of the commission of, or the omission resulting in the offence, suffered loss or damage to any property, order the person so convicted to pay the other person the costs and expenses incurred or compensation for loss or damage to the property and any other costs, in the amount as the court considers fit.

47. Power of recovery of costs and expenses.

(1) Where any segment or element of the environment is polluted by any person in contravention of this Act or the regulations made thereunder the Director General may take such action as is necessary to remove, disperse, destroy or mitigate the pollution and may recover from that person all costs and expenses incurred in connection therewith.

(2) A certificate of the Director General stating that—

(a) it is of the opinion that the person named in the certificate is responsible for such pollution shall be prima facie evidence for the purposes of any proceedings under this section ;

(b) the sum incurred in carrying out all or any of the works required under subsection (1) shall be conclusive proof of the sum due and shall not be subject to any appeal or review in any court.

(3) All and any sum payable by such person shall be a first charge on any property or interest held by such person.

(4) For the purposes of sections 27 and 29 where the discharge or spillage of oil, mixture containing oil or wastes is from—

(a) any ship or two or more ships, the owner of such ship shall be liable or the owner of all such ships concerned shall be jointly and severally liable;

(b) any apparatus used in transferring oil, mixture containing oil or wastes to any ship from a place on land, the person in charge of the apparatus and the employer of that person shall be jointly and severally liable;

(c) any place on land, the occupier thereof shall be liable.

48. Power to detain and sell vehicle or ship.

(1) Where the Director General has reason to believe that any discharge or spillage of oil or mixture containing oil or scheduled wastes was from a vehicle or ship, he may detain the vehicle or ship and the vehicle or ship may be detained until the owner deposits with the Government such sum or furnishes such security as would, in the opinion of the Director General, be adequate to meet the costs and expenses which would be incurred to remove or eliminate the oil or mixture containing oil or scheduled wastes.

(2) If the detained vehicle or ship proceeds to move before it is released, the owner or master, or any person who causes the vehicle or ship to move shall be guilty of an offence and shall be liable to a fine not exceeding fifty thousand ringgit or to imprisonment for a period not exceeding five years or to both.

(3) Where the owner of the vehicle or ship is unable to pay the costs and expenses incurred in removing or eliminating the oil or mixture containing oil or scheduled wastes, the Director General may apply to the court for the sale of the vehicle or ship and use the proceeds to pay for the costs and expenses of removing or eliminating the oil or mixture containing oil or scheduled wastes.

48A. Power to test and prohibit use of vehicle.

(1) The Director General or any officer duly authorized by him in writing may enter and inspect any vehicle in use and for that purpose may require any vehicle to be stopped, and may detain any vehicle during such time as is required for the inspection, and may require the driver of such vehicle to drive it to another place for the purpose of such inspection and may carry out, at the expense of the owner, all such tests and examinations as he considers desirable or necessary to satisfy himself that the provisions of this Act or any regulations made thereunder have been complied with in respect of the vehicle:

Provided that no vehicle shall be detained under this section for a period exceeding forty-eight hours or such longer period as the Director General may by writing authorize in any particular case.

(2) If, on such inspection, it appears to the Director General or officer that, by reason of any defects therein, such vehicle is or is likely to contravene this Act or any regulations made thereunder, he may prohibit the use of such vehicle:

Provided that where in the opinion of the Director General or officer the defects are such as can be remedied within any period not exceeding ten days, the prohibition shall not operate before the expiration of the period.

(3) Where, under subsection (2), the Director General or officer prohibits the use of a vehicle, he shall forthwith give written notice of such prohibition to the registered owner of the vehicle and to the person in charge thereof.

(4) In the case of prohibition on the grounds of such defects as are specified in the proviso to subsection (2), the notice given under subsection (3) shall specify the period within which the defects can in the opinion of such officer be remedied and may require the registered owner of the vehicle or the person in charge thereof to produce for his inspection the vehicle at such convenient time and place as may be specified in the notice.

(5) A prohibition order made under subsection (2) which has become effective may be removed by the Director General or any officer duly authorized by the Director General in writing if he is satisfied that the vehicle is fit for use.

(6) Where the Director General or an officer withdraws or removes a prohibition he shall give notice of that withdrawal or removal to the registered owner of the vehicle.

(7) The Director General or the officer may by notice in writing require the registered owners of the vehicle to produce for his inspection, at such convenient time and place as may be specified in the notice, any document relating

to the vehicle.

(8) If any person fails to comply with this section, or uses or permits to be used a vehicle at any time whilst a prohibition order under subsection (2) is in force in relation to such vehicle, he shall be guilty of an offence and shall be liable to a fine not exceeding five thousand ringgit or to imprisonment for a period not exceeding one year or to both.

48B. Assistance.

The Director General or any person duly authorized by him may require the assistance of any person in the event of pollution or an imminent threat of pollution to the environment.

49. Delegation.

(1) The Director General may by order delegate any of his powers, duties and functions under this Act with respect to the issue of licences, the investigation of offences and the enforcement of this Act to any public officer, any Government Department, any local authority or any committee of persons appointed by him.

(2) Where the Director General has delegated any power to any Government Department, to any local authority or to any committee, any officer of such Government Department or local authority or any member of such committee may exercise any of the powers which the Director General would be able to do had he been exercising the power himself.

(3) Nothing in this section shall preclude the Director General from any responsibility to protect the environment and from administering this Act.

(4) A delegation may be revoked or varied at any time by the Director General.

50. Secrecy.

Any person who discloses any information obtained by him in connection with the administration or execution of this Act or the regulations made thereunder in relation to any manufacturing process or trade secret used in carrying on any particular trade, industry or process shall, unless the disclosure was made for the purposes of this Act or of any criminal proceedings under this Act or with the consent of the person carrying on that trade, industry or process, be guilty of an offence and shall be liable to a fine not exceeding ten thousand ringgit or to imprisonment not exceeding five years or to both.

51. Regulations.

(1) In addition to and not in derogation of any of the powers contained in any other provisions of this Act, the Minister after consultation with the Council may make regulations for or with respect to—

(a) prescribing fees for examining plans, specifications and information relating to installations or proposed installations the subject of applications for licences or for any other forms of approval given under this Act or any regulations made thereunder;

(b) prescribing standards or criteria for the implementation of any declared environmental policy or classification for the protection of the environment and for protecting beneficial uses;

(c) prescribing standards or criteria for determining when any matter, action or thing is poisonous, noxious. objectionable, detrimental to health, or within any other description referred to in this Act;

(d) prohibiting the discharge, emission, or deposit into the environment of any matter, whether liquid, solid, or gaseous and prohibiting or regulating the use of any specified fuel ;

(e) prescribing ambient air quality standards and emission standards and specifying the maximum permissible concentrations of any matter that may be present in or discharged into the atmosphere;

(ee) prescribing ambient water quality standards and discharge standards and specifying the maximum permissible loads that may be discharged by any source into inland waters, with reference either generally or specifically to the body of waters concerned;

(f) prohibiting the use of any equipment, facility, vehicle, or ship capable of causing pollution or regulating the construction, installation or operation thereof so as to prevent or minimize pollution;

(g) requiring the giving of pollution warnings or alerts;

(h) prohibiting or regulating the open burning of refuse or other combustible matter;

(i) regulating the establishment of sites for the disposal of solid or liquid wastes on or in land;

(j) defining objectionable noise and prescribing standards for tolerable noise;

(k) prohibiting or regulating bathing, swimming, boating or other aquatic activity in or around any waters that may be detrimental to health or welfare or for preventing pollution;

(l) any matter or thing which by this Act is authorized or required or permitted to be prescribed or which is necessary or expedient to be prescribed for carrying this Act into effect ; .

(m) *(Deleted by Act A636)*.

(n) *(Deleted by Act A636)*.

(o) *(Deleted by Act A636)*.

(p) requiring any person handling, storing or using oil or mixture containing oil report discharges and spillages of oil or mixture containing oil into Malaysian waters;

(q) requiring any person handling, storing or using oil or mixture containing oil to store such substance or material and equipment necessary to deal with any oil pollution of the Malaysian waters that may arise in the course of their business;

(r) *(Deleted by Act A636)*.

(s) *(Deleted by Act A636)*.

(t) regulating environmental audit and the submission of an audit report and the appointment of qualified personnel to assist the Director General in carrying out an environmental audit of any vehicle, ship or premises, irrespective of whether the vehicle, ship or premises are prescribed under section 18 or otherwise, and their manner of operation, and prescribing the fees chargeable;

(u) prohibiting or regulating the manufacture, storage, transportation, or the application or use, emission, discharge, or deposit into the environment, of any environmentally hazardous substances;

(v) regulating measures to assess, control, reduce or eliminate environmental risk;

(w) regulating the competency of persons qualified to maintain and operate any equipment or control equipment.

(2) Any such regulation may be general or may be restricted in operation as to time, place, persons or circumstances whether any such time, place, person or circumstance is determined or ascertainable before, at or after the making of the regulations.

Appendix 2
Environmental Quality (Scheduled Wastes) Regulations 1989

Environmental Quality (Scheduled Wastes) Regulations, 1989

In exercise of the powers conferred by sections 21 and 51 of the Environmental Quality Act 1974, the Minister after consultation with the Environmental Quality Council, makes the following regulations:

1. Citation and commencement.

These Regulations may be cited as the Environmental Quality (Scheduled Wastes) Regulations 1989 and shall come into force on the 1st May 1989.

2. Interpretation.

(1) In these Regulations, unless the context otherwise requires—

"contractor" means any person undertaking the handling, transport or storage of scheduled wastes outside the premises of a waste generator;

"Incompatible scheduled wastes" means scheduled wastes specified in the Fourth Schedule which, when mixed, will produce hazardous situations through heat generation fires explosions or the release of toxic substances;

"prescribed premises" means premises prescribed by the Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989;

"on-site treatment facility" means a facility, other than a scheduled waste incinerator or a land treatment facility, located on a waste generator's site and that is used solely to deal with scheduled wastes produced on that site;

"scheduled wastes" means any waste falling within the categories of waste listed in the First Schedule;

"waste generator" means any person who generates scheduled wastes.

(2) Words and expressions which are not defined in these Regulations shall have the same meaning as assigned to them in the Act and in the Environmental Quality (Prescribed Premises) (Scheduled Waste Treatment and Disposal Facilities) Order 1989.

3. Notification of the generation of scheduled wastes.

(1) The generation of any scheduled waste shall be notified to the Director General in writing

(a) within one month of its generation, for waste generated after the coming into force of these Regulations;

(b) within three months from the date of coming into force of these Regulations, for waste generated before the date of coming into force of these Regulations.

(2) Every waste generator shall immediately notify the Director General of new categories and quantities of waste which are or which may be generated as a result of any alteration in the operation carried on at the plant used by the waste generator.

(3) The notification given under subregulations (1) and (2) shall be in the form prescribed in the Second Schedule.

4. Disposal of scheduled wastes.

(1) Scheduled wastes shall be disposed of at prescribed premises only.

(2) Scheduled wastes shall, as far as is practicable, prior to disposal, be rendered innocuous.

5. Treatment of scheduled wastes.

Scheduled wastes shall be treated at prescribed premises or at on-site treatment facilities only.

6. Reduction in the generation of scheduled wastes by best practicable means.

The generation of scheduled wastes by every waste generator shall be reduced to the maximum extent practicable using the best practicable means.

7. Responsibility of waste generator.

Every waste generator shall ensure that scheduled wastes generated by him are properly stored treated on-site or delivered to and received at prescribed premises for treatment or disposal.

8. Storage of scheduled wastes.

(1) Scheduled wastes shall be stored in containers which are durable and which are able to prevent spillage or leakage of the scheduled wastes into the environment.

(2) Containers of scheduled wastes shall be clearly labeled in accordance with the Third Schedule for identification and warning purposes .

(3) Incompatible scheduled wastes shall be stored in separate containers.

(4) Areas for the storage of the containers shall he designed, constructed and maintained adequately to prevent spillage or leakage of scheduled wastes into the environment.

9. Waste generator shall keep an inventory of scheduled wastes. A waste generator shall keep accurate and up-to-date inventory, in accordance with the Fifth Schedule, of the quantities and categories of scheduled wastes being generated, treated, and disposed of.

10. Information to be provided by waste generator, contractor and occupier of prescribed premises.

(1) A waste generator shall complete six copies of Part I of the Sixth Schedule and give all six copies of the Schedule to the contractor to whom the scheduled wastes are delivered.

(2) A contractor shall, upon receiving scheduled wastes from a waste generator, complete all six copies of Part II of the Sixth Schedule given to him by the waste generator and shall hand over immediately two copies of the Schedule to the waste generator who in turn shall submit a copy to the Director General.

(3) A contractor shall, upon delivering scheduled wastes to the occupier of any prescribed premises, hand over the

remaining four copies of the Sixth Schedule to the occupier.
(4) The occupier of any prescribed premises shall, upon receiving scheduled wastes from a contractor, complete Part III of all the remaining four copies of the Sixth Schedule handed over to him by the contractor and shall, upon completion, retain one copy and return a copy each to the contractor, the waste generator and the Director General.
(5) If a waste generator fails to receive his copy of the Sixth Schedule from the occupier of the prescribed premises referred to in subregulation (4) within 30 days from the date of delivery of the scheduled wastes to the contractor referred to in subregulation (1) he shall notify the Director General immediately and shall investigate and inform the Director General of the result of his investigation .
11. Scheduled wastes transported outside waste generator's premises to be accompanied by information.
(1) Every waste generator shall provide information in accordance with the Seventh Schedule in respect of each category of scheduled wastes to be delivered to the contractor and shall give the Schedule to the contractor upon delivery of the waste to him.
(2) The waste generator shall inform the contractor of the purpose and use of the Seventh Schedule.
(3) The contractor shall carry with him the Seventh Schedule for each category of scheduled wastes being transported and shall observe and comply with the instructions contained therein.
(4) The contractor shall, in the selection of transportation routes, as far as possible avoid densely populated areas, water catchment areas, and other environmentally sensitive areas.
(5) The contractor shall conduct a training programme for all his employees involved in the handling. transportation and storage of scheduled wastes.
(6) The contractor shall ensure that during the training programme each employee is well informed on the purpose and use of the Seventh Schedule.
12. Spill or accidental discharge.
(1) In the event of any spill or accidental discharge of any scheduled waste. the contractor responsible for the waste shall immediately inform the Director General of the occurrence.
(2) The contractor shall do everything that is practicable to contain, cleanse or abate the spill or accidental discharge and to recover substances involved in the spill or accidental discharge.
(3) The waste generator shall provide the technical expertise and supporting assistance in any clean-up operation referred to in subregulation (2).
(4) The contractor shall undertake studies to determine the impact of the spill or accidental discharge on the environment over a period of time to be determined by the Director General.
13. Compounding of offences.
(1) Every offence which consists of any omission or neglect to comply with, or any act done or attempted to be done contrary to, these Regulations may be compounded under section 45 of the Act .
(2) The compounding of offences referred to in subregulation (1) shall he in accordance with the procedure prescribed in the Environmental Quality (Compounding of Offences) Rules 1978.

First Schedule	Scheduled Wastes
Second Schedule	Notification of Scheduled Wastes (omitted)
Third Schedule	Labelling Requirement for Scheduled Wastes (omitted)
Fourth Schedule	Scheduled Wastes of Potential Incompatibility (omitted)
Fifth Schedule	Inventory of Scheduled Wastes (omitted)
Sixth Schedule	Consignment Note for Scheduled Wastes (omitted)
Seventh Schedule	Information (omitted)

FIRST SCHEDULE

PART I SCHEDULED WASTES FROM NON SPECIFIC SOURCES

1. Mineral oil and oil contaminated wastes
N011 Spent oil or grease used for lubricating industrial machines.
N012 Spent hydraulic oil from machines, including plastic injection moulding machines, turbines and die-casting machines.
N013 Spent oil-water emulsion used as coolants.
N014 Oil tanker sludges.
N015 Oil-water mixture such as ballast water.
N016 Sludge from oil storage tank.
2. Waste containing polychlorinated biphenyls (PCB) or polychlorinated biphenyls (PCB)
N021 Spent oil contaminated with PCB or PCT.
N022 Discarded electrical equipment or parts containing or contaminated with PCB or PCT.
N023 Containers contaminated with PCB or PCT.
3. Spent organic solvents containing halogen or sulphur, including methylene chloride, 1,1,1, trichloroethane, perchloroethylene and dimethyl sulphide
N031 Spent halogenated solvents from cleaning and degreasing processes.
4. Spent aromatic organic solvents without containing compounds of organic halogen or sulphur, including toluene, xylene. turpentine and kerosene
N041 Spent aromatic organic solvents from washing, cleaning or degreasing processes.
5. Spent non-aromatic organic solvents without containing compounds of organic halogen or sulphur, including acetone, ketones, alcohols, cleansing-benzene and dimethyl formamide
N051 Spent non-aromatic organic solvents from washing, cleaning or degreasing processes.
6. Residues from recovery of halogenated solvents, may contain oil, fat and solvents
N061 Residues from recovery of halogenated solvents.
7. Residues from recovery of non-halogenated solvents, may contain oil. fat and solvents
N071 Residues from recovery of non-halogenated solvents.
8. Spent organometallic compounds may be mixed with benzene excluding mercury compounds
N081 Residues of organometallic compounds, including tetraethyl lead, tetramethyl lead and organotin compounds from mixing process of anti-knock compound with gasoline .
9. Flux wastes, may contain mixture of organic acids, solvents or compounds of ammonium chloride
N091 Flux wastes from fluxing bath of metal treatment processes.
10. Spent aqueous alkaline solutions not containing cyanide, may contain heavy metals
N101 Spent aqueous alkaline solutions from treatment process of metal or plastic surfaces.
N102 Spent aqueous alkaline solutions from bleaching process of textile materials.
11. Spent aqueous alkaline solutions containing cyanide, may contain heavy metals
N111 Spent aqueous alkaline solution containing cyanide from treatment process of metal or plastic surfaces.
12. Spent aqueous chromic acid solutions
N121 Spent aqueous chromic acid solutions from treatment process of metal or plastic surfaces.
N122 Spent aqueous chromic acid s6lution from leather tannery processes
13. Spent aqueous inorganic acid solutions other than spent chromic acid solutions, may contain heavy metals
N131 Spent aqueous acid solutions from treatment process of metal or plastic surfaces.
N132 Spent aqueous inorganic acid solutions from industrial equipment cleaning.
14. Spent aqueous or discarded photographic waste from film processing or plates making
N141 Spent aqueous or discarded photographic waste from film processing or plate making.
15. Metal hydroxide sludges containing one or several metals, including chromium, copper, nickel, zinc, lead, cadmium, aluminium and tin
N151 Metal hydroxide sludges from wastewater treatment system.
16. Plating bath sludges containing cyanide
N161 Plating bath sludges containing cyanide from metal finishing processes.
17. Spent salt containing cyanide
N171 Spent salt containing cyanide from heat treatment process.
18. Sludges of inks, paints pigments lacquer with or without organic solvent
N181 Paint sludges from solvent recovery of solvent-based paint waste.
N182 Ink sludges from solvent recovery of solvent-based ink waste.
N183 Lacquer sludges from solvent recovery of solvent-based lacquer waste.
N184 Paint sludges from paint wastewater treatment system.
N185 Ink sludges from ink wastewater treatment system.
N186 Pigment sludges from pigment wastewater treatment system.

19. Wastes of printing ink, paint, pigment, lacquer or varnish containing organic solvents
N191 Discarded or off specification ink, pigment and paint products.
20. Sludges, dust, slag. dross and ashes, may contain oxides or sulphate of one or several metals, including lead, cadmium, copper, zinc, chromium, Nickel, iron, vanadium and aluminium
N201 Dross, slag, ash, dust from metal smelting process or dust emission control system.
N202 Dross from soldering process.
N203 Residues from recovery of acid pickling liquor.
N204 Oxide or sulphate sludges from wastewater treatment system.
21. Spent or discarded strong acids or alkalis
N211 Spent or discarded acid of pH less or equal to 2.
N212 Spent or discarded alkali of pH greater or equal to 12.5.
22. Spent oxidizing agents
N221 Spent oxidizing agent.
23. Contaminated soil, water. debris or matter resulting from clean-up of a spill or chemical or scheduled waste
N231 Contaminated soil , water debris or matter resulting from clean-up of a spill of chemical or scheduled waste.
24. Immobilized scheduled wastes, including chemically fixed or encapsulated sludges
N241 Immobilized scheduled wastes.
25. Discarded drugs except living vaccines and euphoric compounds
N251 Discarded drugs except living vaccines and euphoric compounds.
26. Pathogenic and clinical wastes and quarantined materials
N261 Pathogenic and clinical wastes and quarantined materials.
27. Containers and bags containing hazardous residues
N271 Used containers or bags contaminated with cyanide , arsenic, chromium or lead compound or salts.
28. Mixtures of scheduled wastes
N281 A mixture of scheduled wastes.
N282 A mixture of scheduled and non-scheduled wastes.

PART II SCHEDULED WASTES FROM SPECIFIC SOURCES

1. Mineral oil and oil contaminated wastes
S011 Waste oil or oily sludge from wastewater treatment plant of oil refinery or crude oil terminal.
S012 Oily residue from automotive workshop or service station oil or grease interceptor.
S013 Oil contaminated earth from re-refining of used lubricating oil.
S014 Oil or sludge from oil refinery maintenance operation.
2. Tar or tarry residues from oil refinery or petrochemical plant
S021 Tar or tarry residues from oil refine or petrochemical plant.
3. Wastes of printing ink. paint, pigment, lacquer, varnish or wood preservative containing organic solvents
S031 Ink waste from washing of reaction tank or container of ink manufacturing plant.
S032 Paint waste from washing of reaction tank or container of paint manufacturing plant.
S033 Pigment waste from washing of reaction tank or container of pigment manufacturing plant.
S034 Lacquer or varnish waste from washing of reaction tank or container of lacquer or varnish manufacturing plant.
4. Clinker, slag and ashes from scheduled wastes incinerator
S041 Clinker, slag and ashes from scheduled wastes incinerator.
5. Waste of printing ink, pigment, paint, or lacquer without containing solvents
S051 Water-based paint waste from the washing of reaction tank or container of paint manufacturing plant.
S052 Water-based ink waste from the washing of reaction tank or container of ink manufacturing plant.
S053 Water-based pigment waste from the washing of reaction tank or container of pigment manufacturing plant.
S054 Ink waste from the washing or cleansing of printing machine of printing works.
S055 Pigment waste from tile works and hat manufacturing plant.
S056 Paint waste from the paint spraying or dipping process of metal works, motor vehicle assembly plant or electrical appliances manufacturing plant.
6. Spent tars or anti-corrosion oils
S061 Anti-corrosion oil or tar residue from the sealing or spraying or costing processes of motor vehicle assembly plant or automotive workshop .
7. Spent ethylene glycol
S071 Contaminated ethylene glycol from gas processing plant.
S072 Unhardened ethylene glycol from polyester manufacturing plant.
8. Wastes containing phenol or formaldehyde

S081 Phenol or formaldehyde waste from the washing or reaction or mixing tank of adhesive or glue or resin manufacturing plant.
S082 Sludges containing phenol or formaldehyde from the wastewater treatment system of adhesive or glue or resin manufacturing plant.
9. Residues of isocyanate compounds, excluding solid polymeric materials
S091 Residues of isocyanate compounds from foam manufacturing process .
10. Adhesive or glue waste may contain organic solvents, excluding solid polymeric materials
S101 Off-specification adhesive or glue products from adhesive or glue manufacturing plant.
S102 Effluent from washing of the reaction or processing tank of adhesive or glue manufacturing plant.
11. Uncured resin waste, may contain organic solvents or heavy metals including epoxy resin, phenolic resin
S111 Uncured resin residues from electronic or Semiconductor, electrical appliances, fiberglass manufacturing plants and metal works.
S112 Effluent from washing of reactor of resin manufacturing plant.
S113 Resin sludge from wastewater treatment system of resin manufacturing plant.
12. Latex effluent. rubber or latex sludges containing organic solvents or heavy metals
S121 Rubber or latex sludge containing heavy metals from the wastewater treatment system of rubber products manufacturing plant .
S122 Rubber or latex sludge containing organic solvents from rubber products manufacturing plant.
S123 Latex effluent from rubber products manufacturing plants .
13. Sludges from the re-refining of used oil products including oily sludges containing acid or lead compounds
S131 Acid sludge from the re-refining of used lubricating oil.
14. Sludges containing fluoride
S141 Sludges containing fluoride from the wastewater treatment system of electronic or semiconductor manufacturing plant.
15. Mineral sludges, including calcium hydroxide sludges, phosphating sludges, calcium sulphite sludges and carbonates sludges
S151 Sludges from phosphating process of motor vehicle assembly, air conditioning, electrical appliances and electronic or semiconductor plants.
S152 Sludges from wastewater treatment system of plant producing ceramic or tiles, industrial gas and bleaching earth.
16. Asbestos wastes
S161 Asbestos sludges from wastewater treatment system of asbestos/cement products manufacturing plant.
S162 Asbestos dusts or loose asbestos fibre wastes from asbestos/cement products manufacturing plant.
S163 Empty bags or sack containing loose asbestos fibres from asbestos/cement products manufacturing plant.
17. Wastes from the production. formulation and trade of pesticides; including herbicides, insecticides, rodenticides and fungicides
S171 Dust from air emission control equipment of pesticides formulation plant.
S172 Sludges from wastewater treatment system of pesticides formulation plant.
S173 Residues from filtering process of intermediate products at pesticides formulation plant.
S174 Waste from washing of reaction tank or mixing tank and spillages at pesticides formulation plant.
S175 Solid residues resulting from stamping process of mosquito coil production plant.
S176 Off-specification products from pesticides formulation plant and trade of pesticides.
S177 Waste from the production of pesticides.
18. Press cake from pretreatment of glycerol soap lye
S181 Press cake from pretreatment of glycerol soap lye from detergent or soap or toiletries plants.
19. Wastes containing dye
S191 Wastewater containing dye from textile manufacturing plant.
20. Wastes from wood preserving operation using inorganic salts containing copper, chromium as well as arsenic of fluoride compounds or using compound containing chlorinated phenol or creosote.
S201 Wastes from wood preserving operation using inorganic salts containing copper chromium and arsenic of fluoride compounds or using compound containing chlorinated phenol or creosote.
21. Mercury wastes, containing metallic mercury, organic and inorganic mercury compounds
S211 Mercury waste containing metallic mercury from manufacturing of fluorescent lamps.
S212 Activated carbon waste containing mercury from hydrogen gas purification process.
S213 Mercury bearing sludges from brine treatment and mercury bearing brine purification moods from chlorine production plant.
22. Arsenic wastes from the purification process of phosphoric acid
S22 Arsenic waste from the purification of phosphoric acid plant.
23. Spent catalysts
S231 Spent industrial catalysts from chemical plant and plant manufacturing detergent or soap or toiletries.

24. Leachate from scheduled waste landfills.

S241 Leachate from scheduled waste landfills

25. Rags, papers, plastics. or filters contaminated with organic solvents

S251 Rags, plastics, papers or filters contaminated with paint or ink or organic solvent from motor vehicle assembly plants, metal works, electronic or semiconductor plants and printing or packaging plants.

26. Containers and bags containing hazardous residues

S261 Used containers or bags contaminated with residues of raw materials and products of pesticides formulation plant.

27. Discarded or off specification batteries containing lead mercury, nickel and lithium

S271 Discarded or off specification batteries from battery manufacturing plant.

28. Pharmaceutical wastes

S281 Wastewater from washing of reaction vessels and floors of pharmaceutical products manufacturing plant.

29. Spent aqueous inorganic acid solution

S291 Wastewater from acid and battery manufacturing plant.

30. Waste from manufacturing or processing or use of explosives

S301 Waste from manufacturing or processing or use of explosives.

Appendix 3
Current State of Environmental Practices of Japanese Companies in Malaysia and Other Southeast Asian Countries
(from the 1995 Research on Trends in Environmental Considerations Related to Overseas Activities of Japanese Companies)

1. Summary of the Research

In 1995 the Global Environment Forum carried out a research program to assess the environmental practices of Japanese companies engaged in business activities in overseas countries. The study covered the four Southeast Asian countries of Malaysia, the Philippines, Thailand, and Indonesia, and consisted of a questionnaire and on-site interviews conducted with the help of the local Japanese Chamber of Commerce and Industry in each country.

The questionnaire was distributed to all 2,070 companies, including non-manufacturers and small local offices, on the Japanese Chambers of Commerce and Industry's membership lists for each of the four host countries (individual and institutional members were excluded). Of these, replies were received from 425 companies (20.5% response rate).

In Malaysia, the questionnaire was sent to 452 companies, of which 121 replied (26.8% response rate).

The following summarizes the current state of environmental practices of Japanese companies operating in Malaysia, in comparison with the other three Asian countries (304 respondents in total). In each case, the comparative average for the other three Asian nations is given in parentheses after the figure for Malaysia.

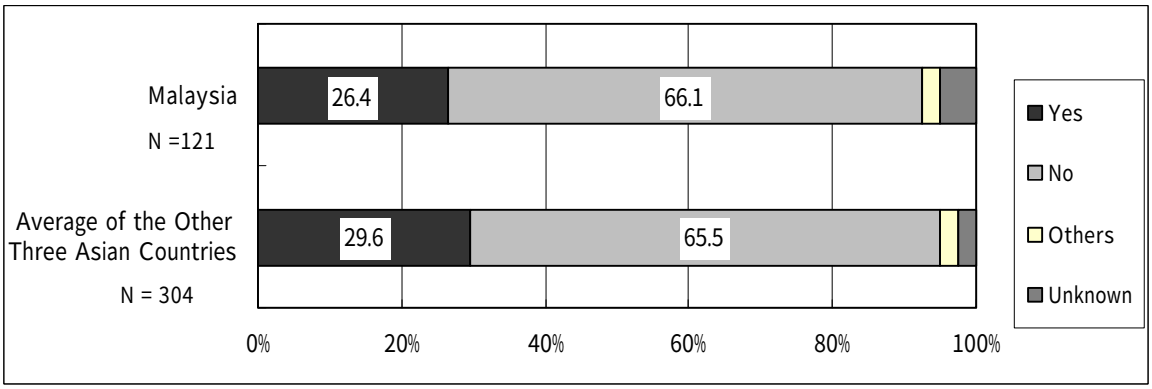
The breakdown by type of industry shows that 72.7% (62.5%) of respondents were manufacturers, and 24.8% (33.9%) were in the non-manufacturing sector (construction, wholesale, finance and insurance, etc.). For number of employees, 26.4% (33.2%) of respondents had less than 100 employees, 33.1% (31.6%) had between 100 and under 500, and 23.1% (18.8%) had 1,000 or more employees.

2. Research Findings

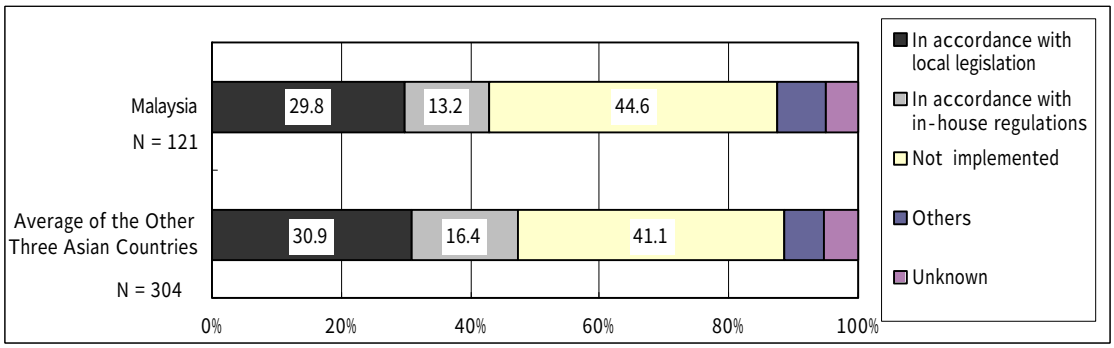
(1) Environmental considerations before establishing overseas operations

Only 26.4% (29.6%) of respondents were legally obliged to carry out an environmental assessment prior to implementing a project in Malaysia (App3-Figure 1). However, as shown in App3-Figure 2, environmental assessments were actually carried out by a far larger percentage of respondents: 43.0% (47.3%). Of these, 29.8% (30.9%) carried out an environmental assessment in accordance with the local legislation of the host country, and 13.2% (16.4%) did so voluntarily.

App3-Figure 1 Was Environmental Assessment Legally Obligatory?



App3-Figure 2 Implementation of Environmental Assessment

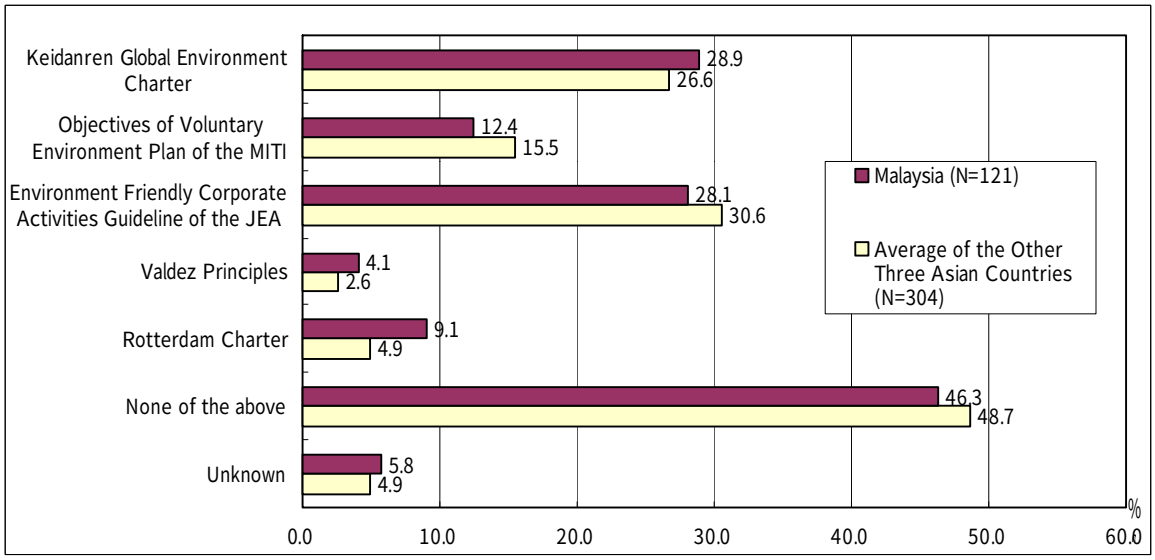


(2) Systems and structures for promoting environmental measures

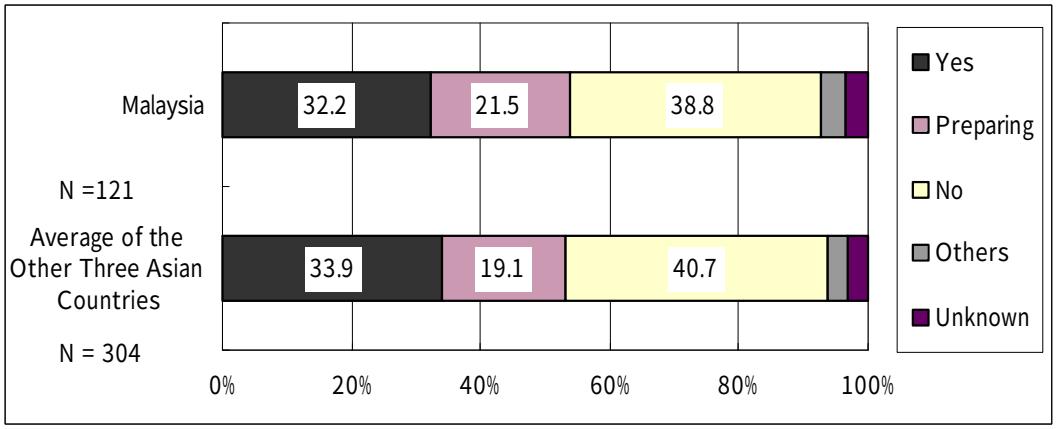
Of the companies that responded to the questionnaire, 28.1% (30.6%) were acquainted with the "Environment Friendly Corporate Activities Guideline" published by the Japanese Environment Agency, and 28.9% (26.6%) knew of the "Keidanren Global Environment Charter" adopted by the Federation of Economic Organizations (Keidanren) (see App3-Figure 3; multiple answers permitted). In addition, 53.7% (53.0%) of respondents had already established, or were in the process of establishing, company-wide management policies related to the environment (App3-Figure 4).

As shown in App3-Figure 5, 55.3% (49.7%) of respondents had some kind of section or personnel for handling environmental matters. Of these, 9.9% (11.5%) had a section exclusively designated for that purpose, 6.6% (3.3%) had exclusively designated staff, and 38.8% (33.9%) had staff who were assigned environmental duties in addition to other responsibilities.

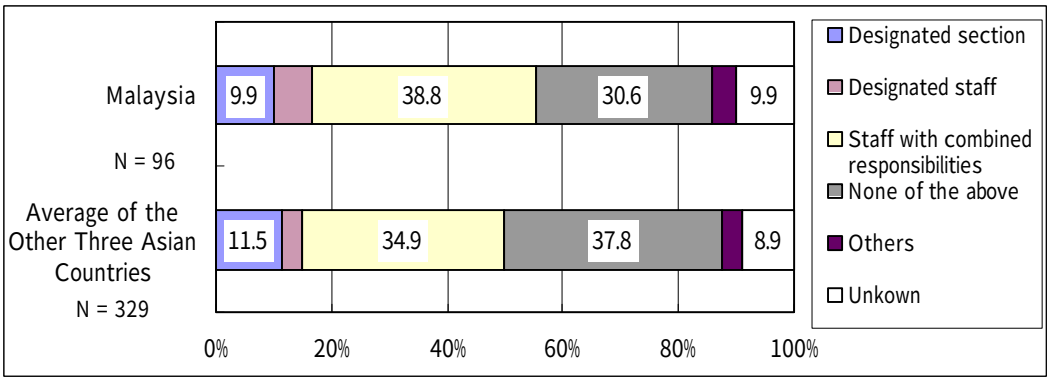
App3-Figure 3 Level of Awareness of Established Guidelines and Charters (Multiple answers permitted)



App3-Figure 4 Does Your Company Have Environmental Policies?



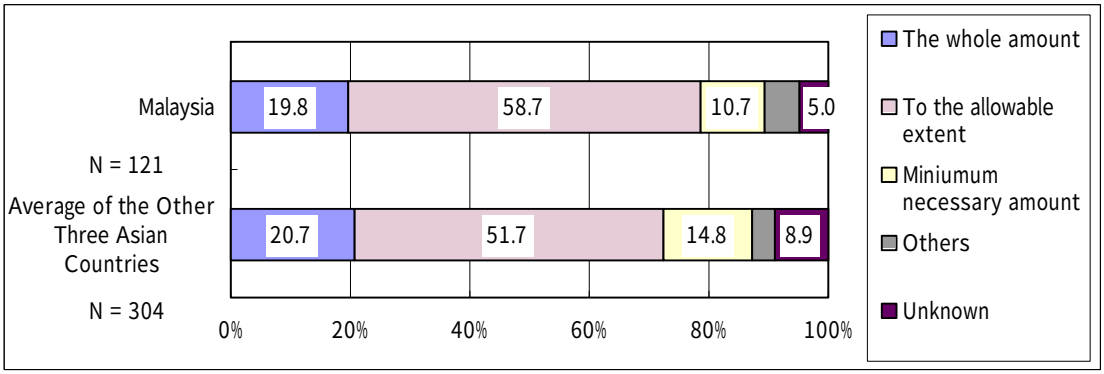
App3-Figure 5 Does Your Company Have Sections or Personnel Assigned to Environmental Management?



(3) Attitudes of companies toward environmental issues

App 3-Figure 6 shows the attitude of respondents toward expenditure and investment for environmental conservation. Companies willing to spend more than the minimum necessary amount to satisfy the current regulations accounted for 78.5% (72.4%), those willing to bear the necessary cost regardless of the company's business performance accounted for 19.8% (20.7%), and those willing to do so to the best of their ability as long as no serious adverse effect was felt on business performance accounted for 58.7% (51.7%).

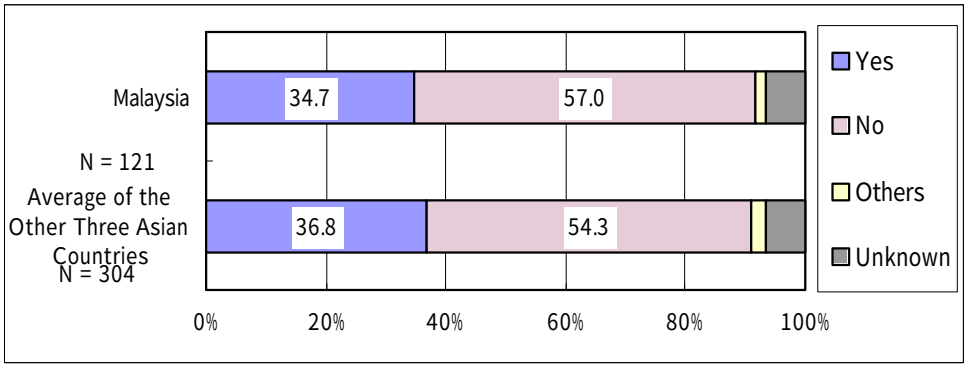
App3-Figure 6 Attitudes to Corporate Expenditure on Environmental Conservation



(4) Environmental issues surrounding operations in host countries

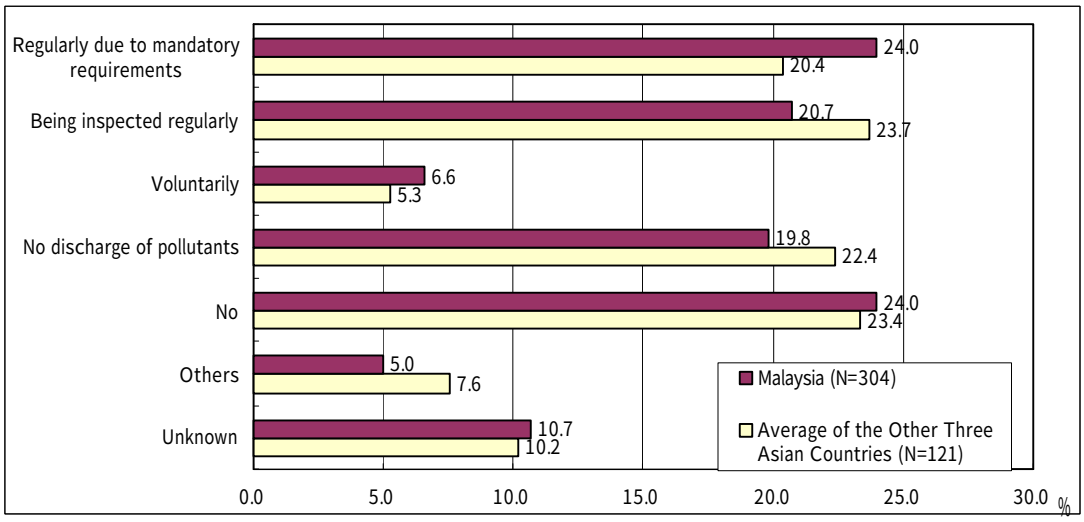
App3-Figure 7 shows that 34.7% (36.8%) of respondents were subject to the government regulations on air emission, effluent discharge, and other forms of pollution in the host country.

App3-Figure 7 Is Your Company Subject to Environmental Regulations?



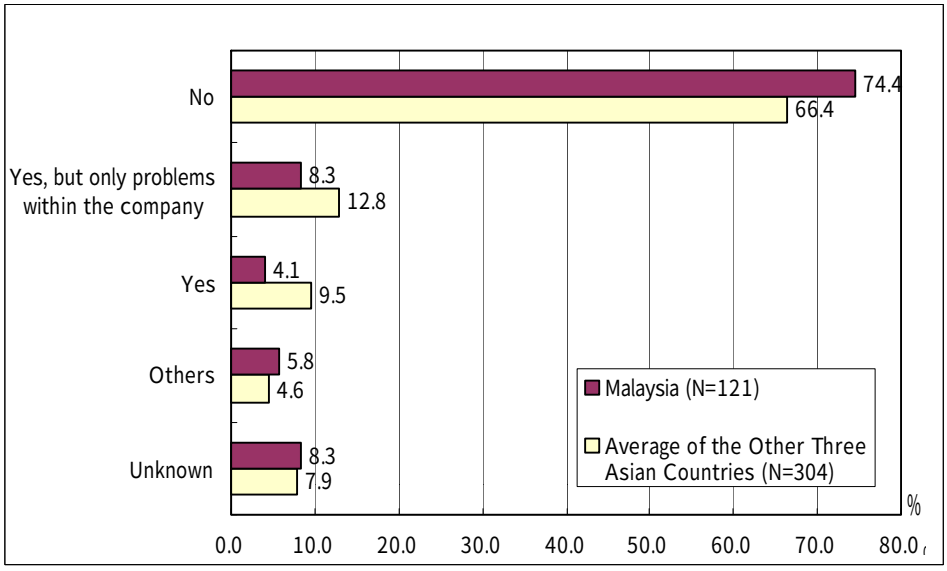
The questionnaire revealed that 30.6% (25.7%) of companies were reporting air emission and effluent measurements to the local authorities (App3-Figure 8). Among the companies of 30.6% (25.7%) above mentioned, 24.0% (20.4%) filed reports because of mandatory requirements, 6.6% (5.3%) reported on a voluntary basis, and 20.7% (23.7%) were subject to mandatory periodic inspections.

App3-Figure 8 Does Your Company Report Emission and Effluent Quality Measurements? (multiple answers permitted)



In regard to environmental problems, 12.4% (22.3%) of companies had encountered some kind of environmental problem in the course of operation, including minor ones with no effects outside the company premises (App3-Figure 9).

App3-Figure 9 Has Your Company Encountered any Environmental Problems and What Kinds of Problems?

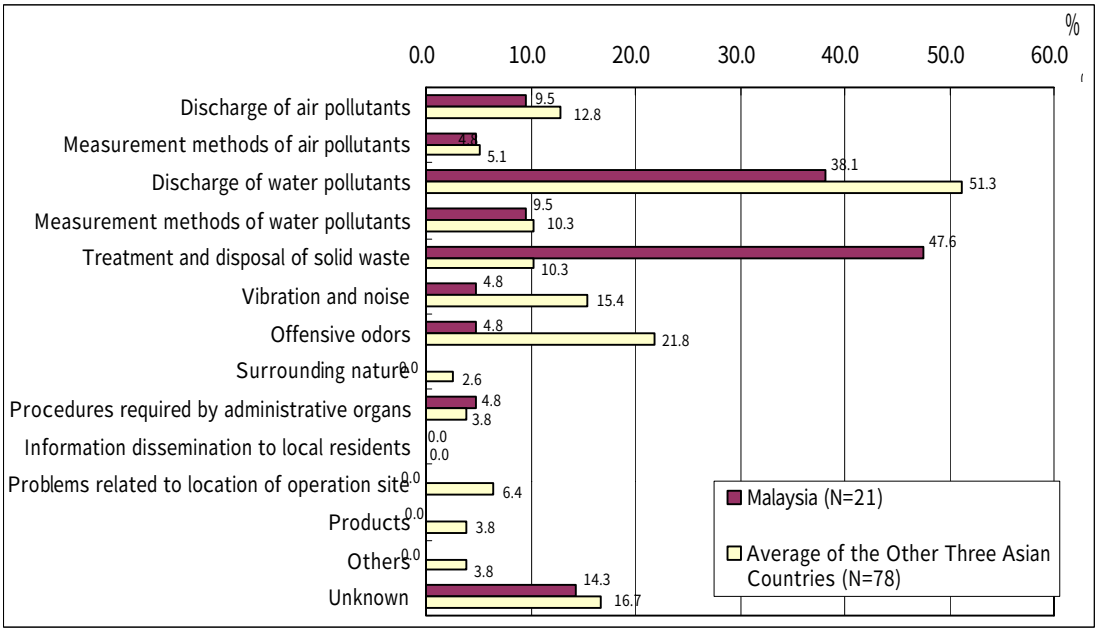


Of the types of environmental problems encountered, the most common problem was waste treatment and disposal, which scored 47.6% (10.3%), followed by discharge of wastewater at 38.1% (51.3%). The next most common problems were discharge of air pollutants and methods of measuring water quality, both scoring 9.5% (12.8% and 10.3%). Compared with the averages for the other three Asian nations, Malaysia reported a particularly high rate of solid waste problems, but drew a low response regarding offensive odors (App3-Figure 10; multiple answers permitted).

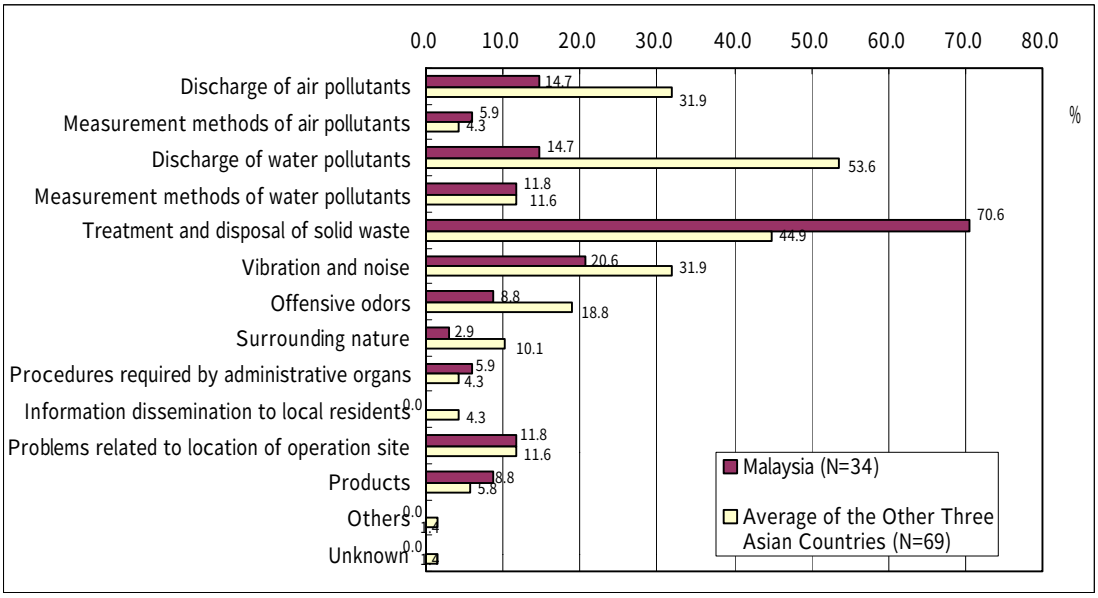
According to the on-site interviews, Japanese companies in all of the four Asian countries surveyed are employing the most advanced techniques available for treating wastewater from production processes in the host country. However, it was observed that some companies were not treating the household wastewater originating within the premises. The interviews also revealed that some companies, unable to find proper disposal sites, were continuing to store solid waste on-site. Unless appropriate management techniques are implemented, this situation could lead to environmental problems and holds serious implications for the future.

Of the companies that responded to the questionnaire, 28.1% (22.7%) believe that environmental problems may arise in the future. Among the issues anticipated, waste treatment and disposal accounted for 70.6% (44.9%), and vibration and noise accounted for 20.6% (31.9%) (App3-Figure 11; multiple answers permitted).

App3-Figure 10 Past Environmental Problems and Issues (multiple answers permitted)



App3-Figure 11 Anticipated Environmental Problems and Issues (multiple answers permitted)

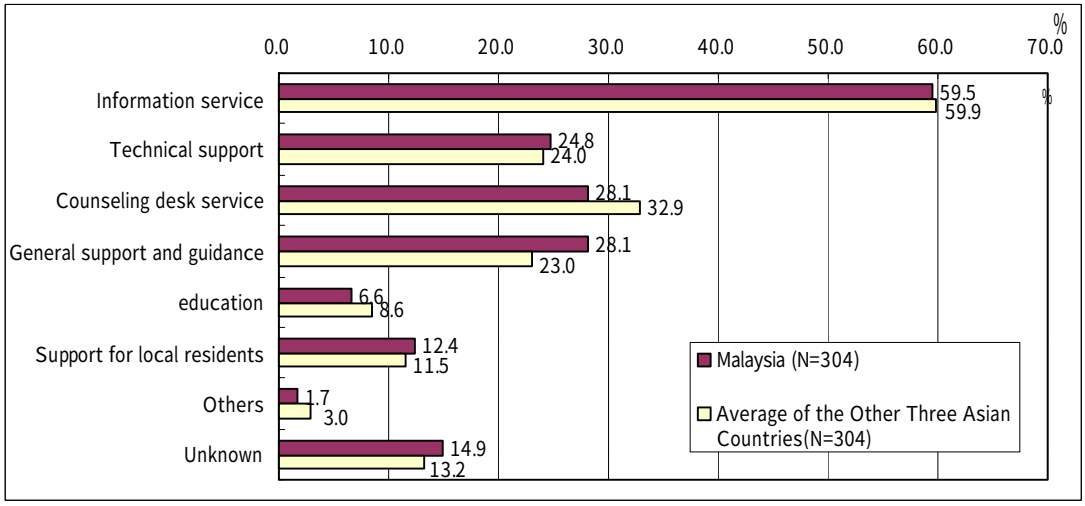


(5) Actions expected from the Japanese government

Companies were asked how the Japanese government should assist Japanese companies operating overseas to establish more thorough-going environmental practices. Common responses were the dissemination of environment-related information relevant to each host country (i.e. preparation of manuals) which scored 59.5% (59.9%), the establishment of an advisory mechanism in each host country at 28.1% (32.9%), provision of technical guidance and support, and the acceptance of trainees by the Japanese government in order to improve the conservation and measurement technologies of the local administrative bodies in the host country, which also scored 28.1% (23.0%), and provision of technical guidance on measurement methods and other environmental matters specific to each host country, to assist companies planning to set up an overseas base, which scored 24.8% (24.0%) (App3-Figure 12; multiple answers permitted).

During the interviews, there were requests from a number of Japanese companies for the preparation of manuals covering the environmental legislation and current environmental problems in each country. A compilation of case studies about the environmental measures implemented by companies already operating overseas was also requested.

App3-Figure 12 What Do You Expect from the Japanese Government? (multiple answers permitted)



Appendix 4
Sources of Environmental Information in Malaysia and Japan

１．マレーシア / in Malaysia

（１）マレーシア政府機関及びその他機関 / Malaysian government agencies and other institutions

１）科学技術環境省環境局 /Department of Environment, Ministry of Science, Technology and the Environment
Tingkat 12 & 13, Wisma Sime Darby, Jalan Raja Laut, 50662 Kuala Lumpur, Malaysia
phone +60-3-2947844
fax +60-3-2931480
http://www.jas.sains.my/

２）工業開発庁 / Malaysian Industrial Development Authority (MIDA)
6th Floor, Wisma Damansara, Jalan Semantan, 50490 Kuala Lumpur, Malaysia
phone +60-3-2553633
Fax +60-3-2550697/255
http://www.jaring.my/mida/

３）環境局セランゴール事務所/ Department of Environment, Selangor
Tingkat 17, Wisma MPSA, Persiaran Perbandaran, 40000, Shah Alam. Selangor Darul Ehsan, Malaysia
phone +60-3-5594787
fax +60-3-5594788

４）環境局ネグリセンビラン事務所/ Department of Environment, Negeri Sembilan
Tingkat 2-2, 3-2, Wisma Arab-Malaysia, Jalan Tuanku Munawir, 70000, Seremban Negeri Sembilan Darul Khusus, Malaysia
phone +60-6-7649017
fax +60-6-7649019

５）環境局ジョホール事務所/ Department of Environment, Johor
Aras 3 Bangunan Timjaya, Km 7, Jalan Skudai, 81200, Johor Bahru Johor D, Malaysia
phone +60-7-222431
fax +60-7-2230567

６）環境局ペナン事務所/ Department of Environment, Pulau Pinang
5th & 6th Floor, Wisma Peladang, Jalan Kampong Gajah, 12000, Butterworth Pulau Pinang , Malaysia
phone +60-4-3334441
fax +60-4-3316078

７）クオリティ・アラム社/Kualiti Alam Sdn. Bhd.
17th Floor, Menara 2, Faber Towers, Taman Desa, Jalan Kelang Lama, 58100, Kuala Lumpur, Malysia
phone +60-3-7809199
fax +60-3-7801811
www.uem.com.my/KALAM/

（2）日本政府機関及びその他機関/ Japanese government agencies and other institutions

1）在マレーシア日本国大使館 / Embassy of Japan in Kuala Lumpur
No.11 Persiaran Stonor, off Jalan Tun Razak, 50450 Kuala Lumpur, Malaysia
phone +60-3-2427044
fax +60-3-2450126
http://www.embjapan.org.my

2）ジェトロ・クアラルンプール・センター / JETRO (Japan External Trade Organization) Kuala Lumpur Center
23rd Floor, Menara Tun Razak, Jalan Raja Laut, 50350 Kuala Lumpur, Malaysia
phone +60-3-2930244
fax +60-3-2930132

3）国際協力事業団マレーシア事務所 / JICA: Japan International Cooperation Agency, Malaysia Office
Suite 18.1 W, 18th Floor, Wisma Sime Darby, Jalan Raja Laut, 50350 Kuala Lumpur Malaysia
phone +60-3-2935416
fax +60-3-293-1790
http://www.jica.org.my/jica/

4）マレーシア日本人商工会議所 / The Japanese Chamber of Trade & Industry, Malaysia (JACTIM)
Suite 6.01, 6th Floor, Regent Office Block, Peti#4, 160 Jalan Bukit Bintang, 55100, Kuala Lumpur, Malaysia
phone +60-3-2427106, 2414460
fax +60-3-2420483

5）国際協力銀行マレーシア駐在員事務所/ Japan Bank for International Cooperation, Kuala Lumpur Office
22nd Floor, UBN Tower, Jalan P. Ramlee, 50250 Kuala Lumpur, Malaysia
phone +60-3-2323255
fax +60-3-2322115

6）国際交流基金日本文化センター / Japan Cultural Centre KL, Japan Foundation,
6th Floor, WIsma Nusantara, Jalan Punchaku, off Jalan P. Ramlee, 50250, Kuala Lumpur, Malaysia
phone +60-3-2306630
fax +60-3-2306620
http://www.jfkl.org.my/jfkl/

２．日本 / in Japan

（1）日本政府及びその他日本機関/ Japanese government agencies and other institutions

1）環境庁企画調整局地球環境部環境協力室 / Office of Overseas Environmental Cooperation, Global Environment Department, Environment Agency
〒100-0013東京都千代田区霞が関1-2-2
1-2-2 Kazumigaseki, Chiyoda-ku Tokyo 100-0013 Japan
phone (03)3581-3351（代）
fax (03)3581-3423
http://www.eic.or.jp/eanet/

2）日本貿易振興会（ジェトロ） / JETRO (Japan External Trade Organization)
〒105-0001東京都港区虎ノ門2-2-5
2-2-5 Toranomon, Minato-ku Tokyo 105-0001 Japan
phone (03)3582-5522（広報課 / PR Division）
http://www.jetro.go.jp/top/index.html

3）国際協力銀行 / Japan Bank for International Cooperation
〒100-0004東京都千代田区大手町1-4-1
1-4-1 Otemachi, Chiyoda-ku Tokyo 100-0004 Japan
phone (03)5218-3100
http://www.jbic.go.jp/

4）国際協力事業団 / JICA；Japan International Cooperation Agency
〒151-0053東京都渋谷区代々木2-1-1新宿マインズタワー
Shinjuku Maynds Tower Bldg., 1-1-2 Yoyogi, Shibuya-ku Tokyo 151-0053 Japan
phone (03)5352-5311～4
http://www.jica.go.jp/

5）日本貿易振興会アジア経済研究所 / Institute of Developing Economies
〒261-8545千葉県千葉市美浜区若葉3-2-2
3-2-24 Wakaba, Mihama-ku, Chiba-shi, Chiba261-8545 Japan
phone (043)299-9500
fax (043)299-9724
http://www.ide.go.jp/English/index4.html

6）経済団体連合会 / Keidanren, Japan Federation of Economic Organizations
〒100-0004東京都千代田区大手町1-9-4
1-9-4 Otemachi, Chiyoda-ku Tokyo 100-0004 Japan
phone (03)3279-1411
http://www.keidanren.or.jp/indexj.html

７）日本商工会議所国際部中小企業国際化推進室 / International Division, Japan Chamber of Commerce & Industry
〒100-0005**東京都千代田区丸の内**3-2-2
3-2-2 Marunouchi, Chiyoda-ku Tokyo 100-0005 Japan
phone (03)3283-7851
fax (03)93216-6497
http://www.jcci.or.jp/

８）東京商工会議所産業政策部 / Tokyo Chamber of Commerce and Industry
〒100-0005**東京都千代田区丸の内**3-2-2
3-2-2 Marunouchi, Chiyoda-ku Tokyo 100-0005 Japan
phone (03)3283-7619
fax (03)3213-8716
http://www.tokyo-cci.or.jp/

９）（財）地球・人間環境フォーラム / Global Environmentla Forum
〒106-0041**東京都港区麻布台**1-9-7
1-9-7 Azabudai, Minato-ku tokyo 106-0041 Japan
phone (03)5561-9735
fax (03)5561-9737
http://www.shonan.ne.jp/~gef20/gef/

（２）マレーシア政府機関 / Thailand government agencies

１）在日マレーシア大使館/ Embassy of Malaysia in Tokyo
〒150-0036**東京都渋谷区南平台町**20-16
20-16 Nanpeidai-cho, Shibuya-ku Tokyo 150-0036 Japan
phone (03)3476-3840

２）マレーシア工業開発庁日本事務所 / MIDA Japan offices
・東京事務所 / Tokyo office
〒107-0062**東京都港区南青山**5-6-26**青山**246**ビル**4**階**
phone (03）3409-3680/3681
fax (03)3409-3460
http://www.midajapan.or.jp/
・大阪事務所 / Osaka office
〒530-0047**大阪府北区西天満**5-9-3**高橋ビル本館**3**階**
phone (06)6313-3121/3221
fax (06)6313-3321
http://www.midajapan.or.jp/

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・「発展途上国の環境法－東南・南アジア」（1996年、アジア経済研究所）
・「マレーシア環境法ハンドブック」（1995年、マレーシア日本人商工会議所）
・「マレーシアハンドブック」（1998年、マレーシア日本人商工会議所）
・「マレーシアでの事業展開」（1997年、さくら総合研究所）
・「ビジネスガイド・マレーシア」（1998年、日本貿易振興会）
・「進出企業実態調査アジア編～日系製造業の活動状況～1999年版」（1999年、日本貿易振興会）
・「アジア環境白書1997/98」（1997年、東洋経済新報社）
・「海外進出企業総覧<国別編>1999年版」（1999年、東洋経済新報社）
・「ジェトロセンサー 1998年12月号」（1998年、日本貿易振興会）
・「別冊リスク・レビュー第21号<アジア諸国の環境法(第3部)>-タイ、マレーシアの環境法と環境行政」（1996年、日本火災海上保険）
・「平成７年度在外日系企業の環境配慮活動動向調査」（1996年、地球・人間環境フォーラム）

（2）英語 / in English

・*Malaysia Environmental Quality Report 1997* (1998, Department of Environment Ministry of Science, Technology and Environment)
・*Malaysia Environmental Quality Report 1996* (1997, Department of Environment Ministry of Science, Technology and Environment)
・*Environmental Quality Act 1974 (Act127) & Subsidiary Legislations* (1998, International Law Book Services)
・*Environmental Requirements : A Guide for Investors* (6th Edition, 1996, Department of Environment Ministry of Science, Technology and Environment)
・*A Handbook of Environmental Impact Assessment Guidelines* (2nd Edition, 1995, Department of Environment Ministry of Science, Technology and Environment)
・*Environmental Impact Assessment, Procedure and Requirements in Malaysia* (1994, Department of Environment Ministry of Science, Technology and Environment)
・*Guidelines for The Siting and Zoning of Industries* (Revised Edition, 1994, Department of Environment Ministry of Science, Technology and Environment)
・*Environment Malaysia Yearbook 1998* (Environmental Management and Research Association of Malaysia / Centre for Environmental Technologies)

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・**マレーシア科学技術環境省環境局** /Department of Environment, Ministry of Science, Technology and Environment
・**環境局セランゴール州事務所** / Selangor office, Environment Department Ministry of Science, Technology and Environment
・**マレーシア日本人商工会議所** / The Japanese Chamber of Trade and Industry, Malaysia
・**ジェトロ・クアラルンプール・センター** / JETRO(Japan External Trade Organization) Kuala Lumpur Center
・**国際協力事業団マレイシア事務所** / JAICA (Japan International Cooperation Agency) Malaysia Office
・**多くの在マレーシア日系企業のみなさん** / all the staff of the Japanese companies in Malaysia
・**クオリティ・アラム社** / Kualiti Alam Sdn. Bhd.

・**日本商工会議所国際部** / International Division, The Japan Chamber of Commerce & Industry
・**日本貿易振興会技術交流部** /Technology Promotion Department, Japan External Trade Organization
・**同投資交流部** / Investment Promotion Department, Japan External Trade Organization
・**日本鋼管テクノサービス** / Nippon Kokan Techno Service Co.,Ltd.

To perform this survey, we established the FY1999 "Committee to Study Trends in Environmental Considerations in Overseas Activities of Japanese Companies." The committee consisted of the following members.

FY1999 Committee to Study Trends in Environmental Considerations in Overseas Activities of Japanese Companies (in order of the Japanese syllabary).

Ikeda, Masahito	Deputy Director General, Research Institute for Development and Finance, Japan Bank for International Cooperation
Imai, Katsuhito	Manager, Global Environment & Energy Group, Global Environment Bureau, KEIDANREN (Japan Federation of Economic Organizations)
Okada, Kiyoharu	General Manger, Industrial Policy Division, The Tokyo Chamber of Commerce & Industry
Ogano, Syoichi	Professor, Faculty of Education and Human Studies, Akita University
Gotoh, Sukehiro	Director, Social & Environmental Systems Division, National Institute for Environmental Studies, Environment Agency of Japan
Kobayashi, Osamu	Advisor, Tokyo Electric Power Co., Ltd.
Fukami, Hiroaki (Chairperson)	Professor, Economic Faculty of Keio University
Yamaguchi, Mitsutsune	Professor, Economic Faculty of Keio University

Secretariat

Nakadera, Ryoei	Director, Planning and Survey, Global Environmental Forum
Suzuki, Akio	Visiting Researcher, Global Environmental Forum, Director, Research Division, Nippon Kokan Techno Service, Ltd.
Sakamoto, Yuki	Chief Researcher, Planning and Survey, Global Environmental Forum

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GLOBAL ENVIRONMENTAL FORUM
Iikura Bldg. 3rd Fl., Azabudai 1-9-7, Minato-ku,
Tokyo 106-0041 Japan
TEL. 03-5561-9735 / FAX. 03-5561-9737
http：//www.shonan.ne.jp/~gef20/gef/
email:LDW00423@nifty.ne.jp