

A Project Consigned of the Ministry of Environment in 2001

**Overseas Environmental Measures of
Japanese Companies
(Vietnam)**

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

Japanese companies have been prominent in setting up operations outside of Japan, particularly in Southeast Asian countries.

Associated with rapid economic developments, environmental pollution of various forms is becoming serious in these countries, posing social problems of significant dimensions. Various efforts are being made to resolve these problems, with particular emphasis on countermeasures against industrial pollution. However, these countries have not been able to take sufficient measures against pollution, mainly due to the shortages of financial and human resource, technical expertise and experience.

Against this backdrop, Japanese companies, with their advantages of advanced environmental technologies and previous experience in overcoming various forms of industrial pollution at home, are expected to take positive steps toward tackling environmental issues in Asian developing areas (these countries). 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 these countries.

Since fiscal 1996, the Ministry of Environment has retained the Global Environmental Forum to conduct a survey on "Research Report on Trends in Environmental Considerations related to Overseas Activities of Japanese Companies." The survey prepares reports, one for each country, on information on and cases of environmental consideration, which should be useful to Japanese companies advancing to other Asian countries in formulation of their environmental conservation measures. The Global Environmental Forum conducted the study for the Philippines, Indonesia, Thailand and Malaysia in fiscal 1996, 1997, 1998 and 1999, respectively, and prepared Guidebook for Environmental Conservation Measures for each country. These guidebooks are distributed to the concerned parties, mainly to the Japanese companies and related organizations operating in these countries, to provide concerned environmental information.

This Vietnamese edition, the fifth in the series, reports concerns the results of the fiscal 2001 work for Vietnam, which the Ministry of Environment has commissioned to the Global Environmental Forum.

Vietnam was selected as the subject for this fiscal year for the following reasons. Recently an increasing number of Japanese companies are advancing to Vietnam. In a study entitled "Study on Environment-friendly Corporate Activities" by the Ministry of Environment in fiscal 2000, Vietnam ranked second only to China in the number of Japanese business enterprises interested in obtaining information on environment in an orderly form.

Increasing number of Japanese business enterprises are expected to advance to Vietnam and to play a role of an engine for economic development of Vietnam through their business activities. We at the Global Environmental Forum would be very pleased if the latest information on environment in Vietnam contained in this report would help assist in further advancement of the Japanese companies in Vietnam, and a large number of Japanese companies intending to advance to Vietnam, in their environmental conservation practices. We also hope this will eventually help promote policy measures against industrial pollution of Vietnam.

We would like to express our deepest appreciation to all those who assisted us in this project. The Japan External Trade Organization (JETRO) and its Hanoi and Ho Chi Minh City offices offered to us their devoted cooperation in introducing companies willing to participate in the survey. We are grateful to very much to a number of Japanese companies in Vietnam, the National Environment Agency of the government of Vietnam, the Departments of Science, Technology and Environment (DOSTE) of Hanoi and Ho Chi Minh City, who gave generously of their time and cooperated in gathering information.

Contents

- Preface
- Contents
- How to Use this Book

Chapter 1	Overview of Environmental Issues and Environmental Conservation Practices in Vietnam	1
Section 1	Vietnam and Japanese Companies	3
Section 2	Current Environmental Issues in Vietnam	9
Section 3	Environmental Policies and Legislation in Vietnam.....	15
Section 4	Water Pollution Management.....	25
Section 5	Air Pollution Management	31
Section 6	Industrial Waste Management.....	35
Section 7	Environmental Impact Assessment in Vietnam.....	41
Chapter 2	Environmental Conservation by Japanese Companies in Vietnam : Case Studies of Corporate Practices and Policies	45
Section 1	Japanese Companies in Vietnam and Their Environmental Conservation.....	47
Section 2	Cases of Meeting Strict Effluent Standards.....	53
Case 1	Example of Applying Closed System to Plant Wastewater Treatment.....	54
Case 2	Example of Treating Difficult-to-treat Concentrated Wastewater in the Plant Premises	57
Case 3	Example of Plant Conformed to Strict Wastewater Effluent Standards Promulgated after Plant Startup.....	59
Case 4	Example of a Plant in an Industrial Estate Installing its Own Advanced Wastewater Treatment Facility	61
Section 3	Cases of Establishing an Environmental Management System	65
Case 5	Example of Acquisition of the ISO14001 Certification First in Vietnam	66
Case 6	Example of Enhancing Awareness of the Executive of the Joint-venture Partner...	69
Case 7	Example of Transferring Environmental Management to Vietnamese Executives through Acquisition of ISO14001 Certification.....	71

Section 4	Cases of Taking Positive Measures against Industrial Wastes.....	75
Case 8	Example of Storing All Industrial Wastes in the Plant Premises	76
Case 9	Example of Returning Byproducts to Farmland at Cost.....	78
Case 10	Example of Selling all Wastes as Resources	81
Case 11	Example of Converting All Wastes into Resources	82
Section 5	Cases of Innovative Environmental Conservation Measures	83
Case 12	Example of Including Termination Clause in its Tenant Contract of Industrial Estate for a Non-conforming to Environmental Conservation.....	84
Case 13	Example of Setting Additional Standards of Alkyl Mercury and PCBs for the Tenants in an Industrial Estate.....	86
Case 14	Example of Treating Wastewater of High Pollutant Content by a Facility Installed Underground.....	88
Case 15	Example of Positively Promoting Environmental Measures Employee's Environmental Awareness	90
Case 16	Example of Discharging Concentrated Spent Sulfuric Acid with Strict pH Control.....	92
Appendices		93
Appendix 1:	Law on Environmental Protection (January 10, 1994).....	93
Appendix 2:	Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No.175/CP)	103
Appendix 3:	Regulation on Hazardous Waste Management (Decision No.155/1999/QD-TTg).....	117
Appendix 4:	Circular Letter of Guidance on Setting Up and Reviewing the Environmental Impact Assessment (EIA) Report for Investment Projects (Circular Letter No.490/1998/TT-BKHCMNT)	125
Appendix 5:	Water Quality – Surface Water Quality Standards (TCVN5942-1995)	133
Appendix 6:	Air Quality – Ambient Air Quality Standards (TCVN5937-1995).....	135
Appendix 7:	Sources of Environmental Information in Vietnam and Japan.....	137

- References
- Acknowledgements

How to Use This Book

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

Note that the term *Japanese companies in Vietnam*, as used in this book, refers to the corporate members of JETRO, the Japan Business Association in Vietnam and the Japanese Business Association of Ho Chi Minh City, irrespective of any special criteria such as 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 except for industrial estate managing companies. Therefore, the cases of environmental conservation measures presented in Chapter 2 are mostly on manufacturing industry, which make this book oriented toward manufacturing sector.

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

The following describes how this book is organized.

Chapter 1 presents the latest information on the present status of environmental problems and recent trends of legal regulation on environmental control. Chapter 1 contains following seven sections.

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

Section 1, Vietnam and Japanese Companies, sketches the historical relation between Vietnam and Japan, and the process of advancement of Japanese companies to Vietnam. Section 2 explains present status of environmental problems in Vietnam, dealing separately with water pollution, air pollution, and waste problem. Sections 3 to 7 explain in detail information on environment-related laws and regulations, organizations, and various environmental regulations by sector, the kinds of information indispensable to environmental conservation measures by Japanese companies.

Section 3 presents items of importance in environmental policies and environment administrative system of the government, legal regulative system on industrial pollution, and various environment-related procedures that must be followed when a business enterprise advances to Vietnam.

Section 4 to 6 explain the system of legal control and the contents of standards for the three major areas of pollution; namely, water pollution, air pollution and industrial wastes, respectively, all these being essential to controlling industrial pollution. Section 7 presents the system of environmental impact assessment.

The information contained in Chapter 1 was compiled mainly from interviews with the National Environment Agency (NEA) of the Ministry of Science, Technology and Environment (MOSTE) of the government of Vietnam, and the Departments of Science, Technology and Environment (DOSTE) of Hanoi and Ho Chi Minh City, both being representative of local administrative offices for environmental conservation.

Chapter 2 summarizes in Section 1 characteristics of environmental conservation measures by Japanese companies, mostly engaged in manufacturing sector. Chapter 2 presents 16 cases of innovating environmental conservation measures by Japanese companies broken down in the following sections.

- Section 2: Cases of Meeting Strict Effluent Standards (four example)
- Section 3: Cases of Establishing an Environmental Management System (three example)
- Section 4: Cases of Taking Positive Measures against Industrial Wastes (four example)
- Section 5: Cases of Innovative Environmental Conservation Measures (five example)

The environmental measures taken by the Vietnamese manufacturing industries are presently centered on countermeasures against water pollution; therefore, cases cited in the report are also on countermeasures against water pollution. Measures against industrial wastes are expected to become increasingly important. Accordingly, cases for countermeasures against industrial wastes are dealt with in one section. Reflecting endeavors by Japanese companies to establish environmental management systems, which include acquisition of the ISO14001 certification, concerned cases are presented in Section 3.

Section 5 presents cases of innovating endeavors to forestall occurrence of environmental contamination.

At the end of the book, the following appendices are given.

- Appendix 1: Law on Environmental Protection (LEP) (effective since January 10, 1994) (full text)
- Appendix 2: Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (October 18, 1994; Government Decree No. 175/CP) (Excerpt)
- Appendix 3: Regulation on Hazardous Waste Management (July 16, 1999; Decision No. 155/1999/QD-TTg)(except Annex)
- Appendix 4: Circular Letter of Guidance on Setting Up and Reviewing the Environmental Impact Assessment Report for Investment Projects (April 29, 1998; Circular No. 490/1998/TT-BKHCHNMT)
- Appendix 5: Water Quality - Surface Water Quality Standards (TCVN5942-1995)
- Appendix 6: Air Quality - Ambient Air Quality Standards (TCVN5937-1995)
- Appendix 7: Sources of Environmental Information in Vietnam and Japan

Appendix 1 carries the full text of the Law on Environmental Protection to help a better understanding of the law, which was mentioned in Chapter 1 Section 3. Appendix 2 presents excerpts from the Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No.175/CP), which is the implementation rule of the law. Appendix 3 gives the main body of the Regulation on Hazardous Waste Management (Decision No. 155/1999/QD-TTg) that should be referred to when planning measures against industrial wastes. Appendix 4 is the Circular Letter of Guidance on Setting Up and Reviewing the Environmental Impact Assessment Report for Investment Projects (April 29, 1998; Circular No. 490/1998/TT-BKHCHNMT). This presents procedures related to environmental impact assessments, necessary to follow when Japanese companies are required to prepare as they plan to implement projects, including plant construction. Though not directly related to controls on industrial pollution, Appendix 5 and Appendix 6 respectively show environmental standards for such surface waters as river waters and the atmosphere, or desirable quality levels of the two.

The currency exchange rate used in this report is that one Vietnamese Dong (VND) is equal to about 0.009 yen or (1U.S. dollar is nearly equal to 15,000VND) (as of February 2002).

The Vietnamese laws have acronyms of their Vietnamese names ahead of their law numbers. This book puts such Vietnamese acronyms to law numbers in case law numbers are indicated after the law names, to facilitate identification of these laws.

The acronyms seen with the law names given above have their particular meanings; “CP” means the government, “QD” the decision, “TTg” the prime minister, “TT” letter, “BKHCHNMT” the Ministry of Science, Technology and Environment, “TCVN” Vietnam (VN) and Standard (TC), all being acronyms of these words.

Chapter 1

Overview of Environmental Issues and Environmental Conservation Practices in Vietnam

This chapter is divided into seven sections that provide basic information necessary for Japanese companies to implement effective environmental measures in Vietnam.

Section 1 presents the outline of Vietnam and discusses its relations with Japan and Japanese companies, and Section 2 gives information about environmental problems in the country as they exist now. Section 3 explains the country's environmental policy, legislation, administrative structure, and other related matters.

Sections 4 through 6 provide information about the scheme and content of the country's specific environmental regulations designed to deal with water pollution, air pollution, and industrial waste, which are the country's principal environmental challenges and at the same time the problems against which Japanese companies are required to take countermeasures.

Finally, Section 7 describes the process of environmental impact assessment required to be performed prior to building industrial plants or other facilities. In addition, Appendix 1 in the references at the end of this report carries the whole text of the Law on Environmental Protection, which was put into effect in January 1994 and constitutes the basis for Vietnam's environmental policy. Appendices 2 through 4 contain excerpts of three pieces of environmental legislation that have a lot to do with Japanese companies doing business in Vietnam.

Section 1
Vietnam and Japanese Companies

1. Increasingly Closer Japan-Vietnam Relations Centering in Economy

The Socialist Republic of Vietnam (hereinafter called Vietnam), located in the eastern part of the Indochina, has a population of 77 million, the second largest in Southeast Asia after Indonesia. Its land area is 330,000 km², approximately equal to that of Japan less Kyushu. With a geographical shape long and relatively narrow, Vietnam extends as long as 1,650 km from the north to south. In addition to the mainland, it also has islands such as Spratly Islands in the South China Sea. Approximately 75% of Vietnam's land area is mountainous and hilly. Its population and agriculture-centered industry are concentrated in two great river deltas; the Red (Hong) River Delta in the north and the Mekong River Delta in the south.

Japanese people generally have the impression that Vietnam as a whole belongs to the tropical monsoon zone, hot and humid. But its capital, Hanoi, is located north and in the temperate monsoon zone, with the temperate falling below 10°C in winter. In contrast, Ho Chi Minh City, the central city in the south, is in the tropical monsoon zone, with the average temperature ranging from 27 to 29°C throughout the year. Thus the climate varies greatly from region to region.

Vietnam consists of 57 provinces and four cities under central government (Hanoi, Ho Chi Minh City, Hai Phong and Da Nang). The ethnic composition is Vietnamese (the Kinh tribe) 90%, an overwhelming majority, and Chinese 3%, with the rest made up of more than 50 minority ethnic groups, including the Muong and Khmer.

As its official name indicates, Vietnam adopts a socialist republic system of government under the one-party dictatorship by the Vietnamese Communist Party.

Even after the declaration of independence in 1945, Vietnam was in the state of war, though continually; the First Indo-china War that ended in 1954 with the declaration of victory over France; the Vietnam War with the U.S. that ended in 1975; the invasion into Cambodia in 1978; and the Vietnam-China War in 1979. Peaceful society finally realized by signing the peace pact with Cambodia is only a little older than ten years.

This continual state of war had serious adverse effects on the natural environment of the country, including lost forest resources, and at the same time hindered improvement in the people's living standards. To make the matter worse, about ten years of rapid socialization following the end of the Vietnam War intensified the economic difficulties, which include faltering agriculture, the most fundamental industrial sector, and drove the country to the brink of economic collapse. In response, the Vietnamese Communist Party adopted the *Doimoi* or Renovation policy in its sixth Congress in 1986. Under this policy, while maintaining the socialistic systems, the country switched to a new form of economic management that included bold measures for introducing market economy such as recognition of private enterprises, and the opening of the economy to the rest of the world.

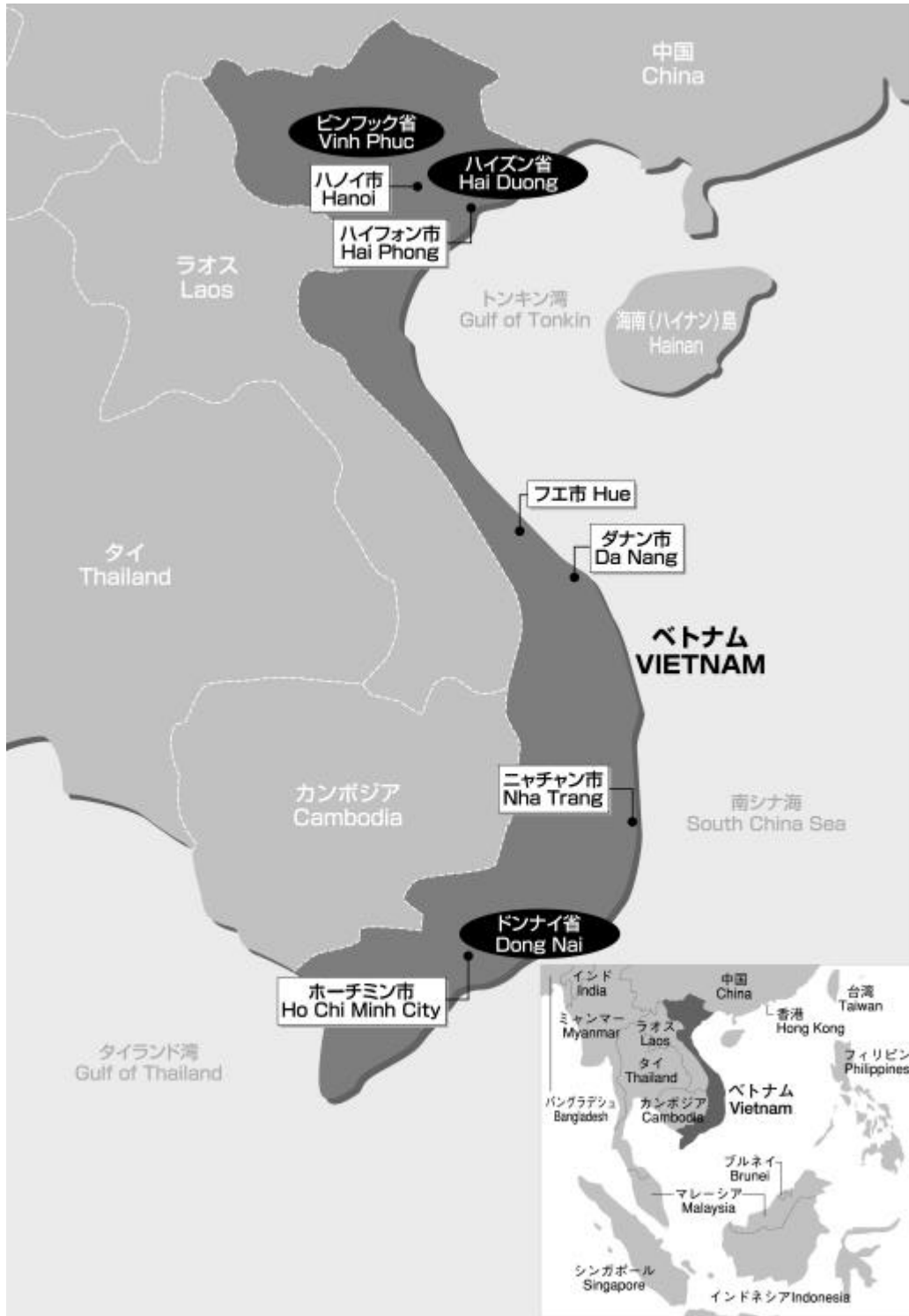
Since around 1989, when the *Doimoi* policy started to have effects, Vietnam has achieved stable, high economic growth through encouraging investment by foreign countries and promoting industrialization. In fact, around 1995, led by rapid economic growth in neighboring Southeast Asian countries, lots of foreign capital flowed into the country, leading to high economic growth.

However, the boom was short-lived. After peaking at 9.5% in 1995, the economic growth gradually slowed down each year to 4.8% in 1999, mainly due to the influences of the currency and economic crisis in Asia in 1997 and the delay in creating favorable investment climate. The Vietnamese Government responded to this situation by providing foreign companies with tax exemption and other preferential treatments, and the growth rate rose back to 6.7% in 2000, showing a recovery trend.

The Vietnamese Government has an ambitious mid-term goal of doubling the GDP over 2000 by 2010 and joining the ranks of industrialized nations of the world by 2020. Toward this end, in the past ten years or so, the government has been steadily working to establish a foundation for economic

development through promoting structural reforms of the society and building social infrastructures to encourage investment by foreign countries, the prime mover of economic development, and through improving external relations, including joining in ASEAN. The country, however, has had to pay a high price for the prolonged state of war and the former Soviet Union type socialist economy. Despite being part of the growth center in Asia and having a large population base and abundant mineral resources, there is no denying that the country was a late entrant in the growth race.

Figure 1-1-1 The Socialist Republic of Vietnam



The country's GDP per capita was only about 400 U.S. dollars as of 2000, still far lower than for its neighbors; Thailand nearly 2,000 U.S. dollars and the Philippines some 1,000 U.S. dollars.

On balance, it may well be said that the high rate of economic growth that has lasted for a while has laid the foundation for the country's sustained growth for the years to come.

Despite affluent potential attractions, Vietnam now faces many challenges, including chronic trade deficits, immature investment climate, and competition with neighboring China for attracting foreign investors. However, in 10 to 20 years, the country can be said to be again on the starting line for bringing its economy up to the level where it is able to match its neighboring Southeast Asian countries.

For Vietnam, Japan is now the largest importer of the country's goods and the largest donor nation of economic assistance. As Japan's direct investment expands by the entry of numerous Japanese companies into there, the ties between the two countries, particularly economic ones, is becoming stronger each year. Interchange between the two countries dates back to the 17th century, when Japan imported raw silk from Vietnam and exported silver and copper there. During the Second World War, Japanese military advanced into Vietnam, then a territory of France, and from March through August 1945, placed the country under its control. The relations have developed on a full scale since the resumption of official development aid (ODA), including yen loans, in 1992 following the conclusion of the Cambodia Peace Pact. And then in 1994, the United States fully lifted the economic sanctions against Vietnam, and this triggered the increase in direct investment by the private sector of Japan, leading to the entry there of a large number of Japanese companies. Thus, the bilateral relations are becoming closer annually, particularly in economic areas. For Vietnam, Japan is now the largest importer and the second largest exporter after Singapore.

Against the background of close economic relations, interchanges of people between the two countries are becoming active, with Japanese visitors to Vietnam increasing to a total of 150,000 a year for not only commercial but also sightseeing purposes. To cope with this increase, flight services between Narita and Ho Chi Minh City were increased last year, and in addition, launching of the direct flight between Hanoi, the capital of Vietnam, and Narita is slated for July 2002. Incidentally, Japanese residents living in Vietnam numbered about 2,700 as of June 2000.

2. Large-scale Entry of Japanese Companies, Mainly Manufacturers, into Vietnam, Beginning in 1994

As mentioned earlier, Vietnam has shown steady economic growth since around 1989, when its *Doimoi* policy began to bear fruit. The main force behind this growth is the increased number of companies moving into Vietnam from Japan and other countries such as Singapore, Taiwan, and South Korea, and associated increase in the amount of direct investment. Foreign direct investment in Vietnam peaked at 8.5 billion U.S. dollars in 1996, exceeding its national budget. Thereafter, however, as its investment climate became known to be saddled with various problems such as tangled bureaucratic procedures, red tape, sluggish sales in immature domestic markets, and relatively high communication, transportation and other business costs due to underdeveloped infrastructure, the direct investment slowed down. In 1999, it dropped to 1.6 billion U.S. dollars partly under the additional influence of the currency and economic crisis of 1997 in Asia. Japan's investment, swelling to over 1.1 billion U.S. dollars in 1995, followed a similar trend, and fell to 62 million U.S. dollars in 1999. Faced with this situation, the Vietnamese Government developed in quick succession a series of measures and incentives for improving investment climate, which included revision of the Law on Foreign Investment, originally enacted in 1988, and reduction of electricity and communication charges for foreign companies for lowering their business cost. As a result, since 2000, the foreign investment has finally been back on course for recovery, but because a large number of negative factors still exist, such as sluggish state of the Japanese economy, there is an urgent need for further measures for better investment climate.

Japanese companies begun to move into Vietnam on a large scale in 1994, when the United States lifted the economic sanctions against Vietnam, and since then the number of Japanese companies moving into

Vietnam has been increasing each year. The result of a survey by Japan External Trade Organization (JETRO) shows that about 80% of the Japanese manufacturers currently operating in Vietnam started operations in 1996 or later, indicating that the entry of Japanese companies occurred largely in the past five or six years, one lap behind the other Southeast Asian countries.

According to another survey by JETRO, the number of Japanese companies in Vietnam, including representative offices, was 355 as of May 2001. By region, there are 117 in the north and 238 in the south. By industrial sector, about half (49%) of the total are in the manufacturing sector, followed by transportation and service 20%, international trade 13%, construction 11%, and finance and insurance 7%. Of the total of 355 companies, about 60% or 205 have made physical investments and started operations. About 75% of the 205 or 154 companies are manufacturers. In the south, 147 companies have begun operations, and 120 companies (about 82% of the total) are manufacturers.

JETRO makes an annual survey of the current state of activities of Japanese companies in Asia. The 2000 survey, conducted in November to December 2000, shows that 87 manufacturers responding from Vietnam are broken down into electric and electronic components 13.8%, clothing and textile products 13.8%, transportation equipment 10.3%, metal products 9.2%, and electrical machinery 6.9%. This breakdown is characterized by a higher percentage for clothing and textile products than in other Southeast Asian countries, though the percentages for electric and electronic components are at similar levels. Further, most of the manufacturers of clothing and textile products are export-oriented, using Vietnam as a production base, while many of the manufactures of automobiles, motorcycles and other transportation equipment are geared to Vietnamese domestic markets.

Development of the Vietnamese economy is centered on Ho Chi Minh City in the south, and Hanoi and Hai Phong in the north, and many Japanese companies are located in these areas. The availability of industrial estates is also largely limited to these areas. Therefore, most Japanese manufacturers are sited in Ho Chi Minh City and adjacent provinces of Dong Nai and Binh Duong, and in Hanoi and areas surrounding it, namely, the province of Vinh Phuc and the city of Hai Phong.

In recent years, many of Japanese companies moving into Vietnam have set up their facilities in industrial estates or export processing zones. Of the above-mentioned 154 manufacturers operating in Vietnam, 60% or 93 companies are located in either of them. Particularly, the Tan Thuan Export Processing Zone in Ho Chi Minh City and the Bien Hoa Industrial Estate in the province of Dong Nai have a large concentration of Japanese companies. Several Japanese industrial estates are also in operation.

In the past, Japanese companies mostly moved into Vietnam in the form of a joint venture with a state-owned Vietnamese enterprise because they needed to rely on the local partners for acquiring land and carrying out governmental formalities in that country. With the building of industrial estates and export processing zones, however, there are an increasing number of Japanese companies that enter the country in the form of their wholly owned subsidiaries. Also, direct investment from Japan was a norm when they moved into Vietnam, but in the recent two to three years, indirect investment through Japanese companies operating in other Asian countries has become a notable way of Japanese investment in Vietnam. Japanese companies operating in other Asian countries make investment in Vietnam for further cost reductions and business diversification. These Japanese companies established in an overseas country by indirect investment through other countries are sometimes called "grandchild companies."

Two most conspicuous reasons for the entry of Japanese companies into Vietnam are low labor cost - some 10,000 yen a month for average factory workers - and affluent manpower supply. Other reasons often cited include (1) talented Vietnamese with high literacy rates, dexterity and low turnover rates, (2) attractive populous domestic markets, and (3) the stable political system.

3. Japanese Companies in Vietnam Expected to be Leaders in Environmental Protection

In Vietnam, air and water pollution has become a social issue, particularly in urban areas, where as a result of economic development, people and factories are concentrated. Because of a lack of appropriate treatment facilities, waste has also become a serious problem. The Vietnamese Government has coped with this situation by establishing environmental laws and regulations starting with the enactment of the Law on Environmental Protection (LEP) in 1994. However, both personnel and budgetary foundations of environmental administrative organizations, central or local, are vulnerable and not adequate for enforcing the environmental laws and regulations effectively. To make the matter worse, in Vietnam today, where top priority is given to economic growth, environmental measures are assigned low priority, and a majority of citizens do not seem to be much concerned about environmental pollution.

When we look at industrial pollution alone, old production facilities and state-owned enterprises with scarce financial strength for implementing pollution control measures are problems that may not be shunned. With an increase in the number of private businesses, including foreign companies, the composition ratio of state-owned enterprises is now down to about 40% in mining and manufacturing sectors, but these enterprises are implementing almost no pollution control measures. More than 60 industrial estates located across the country are equipped with no central wastewater treatment facilities and other environmental protection equipment, except for those affiliated with Japanese companies or others that are recently built. It can safely be said that other than part of the foreign companies that are active in environmental protection, all are implementing almost no emission and wastewater control measures. When it comes to industrial waste, especially hazardous industrial waste, which is expected to become a serious environmental issue in Vietnam, there are now no facilities within the country that can treat and dispose of them as required by law. Solving such an issue will become a tough challenge for the country.

Under these circumstances, Japanese companies operating in Vietnam have spent a large amount of money vigorously implementing environmental measures, especially for wastewater control. Those manufacturing automobiles, motorcycles, or electric appliances, many of which are internationally well known, have attracted much attention from Vietnam as well as from other countries for their environmental protection efforts. Japanese companies that have financial and technological resources are expected not only to continue their steady environmental protection efforts but also to transfer technology and know-how related to environmental protection to local companies and to be a driving force for promoting Vietnamese environmental protection, the progress in which is currently impeded due to numerous problems.

Section 2
Current Environmental Issues in Vietnam

1. Environmental Problems Piled in Vietnam

Environmental problems facing Vietnam, where the prolonged state of war led to a delay in large-scale industrialization, can be said to be less serious than in Thailand and other Southeast Asian countries that achieved steady, rapid economic growth starting in the late 1980s. In recent years, however, industrial pollution has been caused through more vigorous economic activities, and urban environmental pollution through the population concentration in cities, while effective measures against such pollution have been delayed, allowing environmental pollution to expand gradually.

Another pollution peculiar to Vietnam and not to be forgotten is forest destruction attributable to the defoliant sprayed during the Vietnam War.

As far as industrial pollution is concerned, state-owned enterprises, which were the principal players in the industrial sector for a long time, are the subjects not to be eschewed. They still use old production facilities introduced from some of the former Communist countries and equipped with almost no pollution control equipment, discharging emission and wastewater, which constitute the main causes of industrial pollution. Generally, they stand on a vulnerable management foundation and are not very much financially capable of investing in pollution control measures. However, it would be difficult to close down their polluting facilities, because doing so would increase unemployment and cause social unrest. Thus, their reform that is in progress through merger, abolition and conversion to joint stock companies is the key to the promotion of measures against industrial pollution in Vietnam for the years to come.

Other types of pollution not to be ignored are industrial wastewater being discharged almost untreated into rivers and other water bodies, and pollution caused by small-scale factories located in residential areas.

Hazardous industrial waste poses another serious problem. There exist no treatment facilities for it in Vietnam and their construction is delayed. From now on, hazardous industrial waste is expected to become a serious issue for Japanese companies operating in Vietnam.

As economic activities become more vigorous, more people continue to flow into cities. For example, Ho Chi Minh City has now come to have a population exceeding 5 million. As a result, air pollution due to road traffic and urban pollution caused by annually increasing amounts of domestic wastewater and other waste have become a social issue, especially in major cities. Air pollution caused by motorcycles and automobiles, the numbers of which are rapidly increasing, worsened particularly in the central areas of Hanoi, Ho Chi Minh City, and other large cities. Similarly, in face of increasing amounts of domestic wastewater and other waste, the shortage of facilities to treat and dispose of them has become evident, and much of these wastes are now dumped without appropriate treatment.

To deal with such piles of environmental problems in Vietnam, work has been in progress on the establishment of the foundation for environmental protection, centered on environmental assistance projects sponsored by Japan and many other advanced countries and international organizations. Partly because of insufficient capabilities to respond on the part of Vietnam and fund shortages, however, it will take much time before such efforts produce favorable effects.

On the other hand, economic growth and urbanization will progress regardless, and under the present circumstances, it will be difficult to mitigate the problems in short times, though it may be possible to prevent further aggravation through various measures.

2. Water Pollution

Water pollution may well be called the most fundamental environment problem facing Vietnam, where the leading industry is agriculture centered on rice production.

Water pollution in Vietnam is caused by a combination of industrial and domestic wastewater, and waste dumped into rivers and lakes. The principal reason for the pollution is attributable to underdeveloped infrastructure for preventing water pollution, including a lack or shortage of treatment facilities.

The first is about industrial wastewater. As mentioned earlier, most of the factories of state-owned enterprises, the leader in the industrial sector, are not provided with wastewater treatment equipment. What is more, industrial estates, where a large number of factories are located, are not provided with central wastewater treatment facilities, except for part of them, including recently opened Japanese industrial estates, and make it the responsibility of the tenants themselves to treat their wastewater. For this reason, except some foreign companies, including Japanese ones, most factories, disliking paying construction and operating costs of such treatment facilities, discharge untreated industrial wastewater into nearby rivers, waterways and other water bodies.

Furthermore, in urban areas, where large numbers of small-sized family enterprises are located, nearby rivers to which wastewater is discharged are usually narrow and their flow is not large, making wastewater stay and aggravating the situation. Typical examples are the Kim Nguu River, flowing through the southern industrial district in Hanoi, and the To Lich River, flowing in its southwestern part, both of which were completely turned into drainage canals.

Secondly, domestic wastewater is mixed usually with night soil, rainwater and sometimes with industrial wastewater before being discharged into water bodies. In Hanoi and Ho Chi Minh City, the sewerage systems are old and perform almost none of their intended functions because of a prolonged lack of proper maintenance, only serving as drainage systems that collect wastewater from various sources. As a result, most of their domestic wastewater flows into rivers and other water bodies almost without any treatment, becoming a large source of water pollution. Hanoi has nearly 20 lakes and marshes; all of them are polluted by untreated domestic wastewater.

Such water pollution by industrial and domestic wastewater is not confined to urban waterways or rivers. It extends to the large rivers into which they finally flow, such as the Red (Hong) River in the north, and the Sai Gon River and the Dong Nai River in the south. It is now difficult to utilize water from these large rivers for any domestic or industrial purpose.

In this survey, no recent numerical data on the quality of river water were obtainable, but it is reported that the values of BOD (Biochemical Oxygen Demand) and COD (Chemical Oxygen Demand), indicators of the organic pollution level of water, are rising each year throughout the country. The value of DO (Dissolved Oxygen), another indicator of the water pollution level, is also worsening year by year (lower numerical values means more advanced state of water pollution), and there are a lot of measuring points where the DO level is too low for fish to inhabit. Reportedly, the water quality was on a worsening trend since 1997, which indicates that the major factor affecting it would be increasing quantities of industrial wastewater with growing industrial production. Another factor accelerating the water pollution is increasing waste dumped into rivers and other water bodies.

In coping with this situation, the Vietnamese Government has taken various measures, including more rigorous on-site inspection of factories, the river improvement in urban areas, and the construction of sewage treatment facilities with foreign assistance. But these measures have failed so far to catch up with increasing quantities of wastewater.

3. Air Pollution

There are two major sources of air pollution in Vietnam: One is exhaust gas from motorcycles and automobiles, mainly in urban areas, and another, industrial activities.

Of the two, air pollution caused by exhaust gas has recently become a more serious problem. In Vietnam, motorcycles are the principal means of move. The number of privately owned motorcycles is estimated to be about 6.5 million, which translates into one per every 12 persons. In Hanoi, Ho Chi

Minh City and other large cities, it has become a common sight that the road is filled with motorcycles during morning and evening rush hours. In addition, the number of privately owned automobiles is increasing as well in step with economic development every year, the registered number now reaching about 650,000.

To make the matter worse, the large cities are also marked by numbers of other types of motor vehicle that are difficult to equip with exhaust gas control devices; trucks manufactured in the former Soviet Union and Eastern Bloc countries some 30 years ago and second-hand trucks imported from South Korea and other countries.

Air pollutants discharged from all these motor vehicles are contributing in the center of large cities each year to increase the concentrations of soot and dust, lead, CO (carbon monoxide), NO_x (nitrogen oxides), HC (hydrocarbons), SO₂ (sulfur dioxide) and other matters. Especially, air pollution by soot and dust, and lead has become a serious problem. The Department of Science, Technology and Environment (DOSTE) of Ho Chi Minh City reported that the measurements at a roadside monitoring station in Dien Bien Phu, the central part of the city, in 2000 were 2.1mg/m³ for soot and dust, far higher than the central government's environmental standard; and 0.03mg/m³ for lead, some three times as much as the value specified in WHO's Health Guidelines.

These pollutants have already caused the residents to suffer asthma, bronchitis and other health problems. As the economy grows, the number of motor vehicles will continue increasing rapidly, and measures against exhaust gas are considered to become an important environmental challenge. As part of countermeasures, a regulation providing for the switch to lead-free gasoline was put into effect in July 2001, prohibiting the use of leaded gasoline.

On the other hand, air pollution caused by industrial activities has become a problem in the neighborhoods of industrial estates, coal-fired thermal power plants and other industrial facilities.

Vietnamese companies, mostly state-owned enterprises, are now carrying out almost no measures for controlling air pollution, in complete disregard of the emission standards that exist. In face of this situation, however, the environmental administrative bodies seldom conduct on-site inspection, citing shortages of sampling and analysis equipment for emission gases, virtually leaving the factories to their own devices.

Further, in Vietnam, heavy oil available as fuel in the domestic market is limited to poor quality one with a sulfur content of 3%, and this makes it difficult to take any effective measures against sulfur oxides.

In addition, coal used in the northern region in winter for room heating contributes to seasonal increases in the concentrations of soot and dust, and sulfur oxides in urban areas. Burning waste in the open and allowing black smokes to rise is also a common sight, and air pollution by this has become a problem that can no longer be ignored.

4. Waste

With further progress in industrialization and urbanization, waste is considered to become the greatest challenge to Vietnam in the future. Solid waste discharged from urban areas of the country amounted to 8.1 million tons in 1998, after increasing to 5.9 million tons in 1996 and 7.05 million tons in 1997 for an average annual increase of nearly one million tons. Of this total, 70% to 80% is estimated to be household waste, and the remainder or about 20% industrial waste. In Vietnam, household and industrial waste are collected without being sorted out, and most of them are dumped as landfill, except for part of medical waste. The low rate of collecting waste should also be noted; it ranges from 40 to 67% in urban areas and from 20 to 40% in towns and villages. The national average is as low as 53.4%. Uncollected waste is dumped into rivers, vacant lots or other available places, or burned in the open, becoming a new source of pollution.

What is more, the construction of waste treatment facilities is delayed, and almost no environmental sanitation measures are taken in existing waste treatment facilities. These shortcomings have made waste a more serious problem. There are indeed disposal sites throughout the country. But most are no more than open pits dug in the ground in which waste is piled high without taking any step to confine environmental pollution such as covers to prevent waste from flying off and waterproof sheets to prevent its leachate from seeping into the ground. As a result, wastewater, gases and malodor arising from such waste pollute the surrounding environment.

Waste hauled to such disposal sites includes lots of industrial waste containing hazardous substances, and leachate from them may pollute groundwater.

During this survey, we had an opportunity to visit the Nam Son disposal site in Hanoi, and found no measures are taken there to prevent flying-off, nor are measures to treat leachate. The site does have a plan to install a waste incinerator, but the plan is suspended because there is no hope of securing necessary funds.

In the years ahead, hazardous industrial waste is considered to pose a serious problem to not only Japanese companies but also any other entities engaged in industrial activities in Vietnam. Most of the general industrial waste is plastics, metal, glass or other materials of some monetary value, and they are collected by recycling operators for use as recycling resources.

As for hazardous industrial waste, the Vietnamese Government issued in 1999 the Regulation on Hazardous Waste Management (Decision No.155/1999/QD-TTg), which defines hazardous waste and provides the methods of its transportation, treatment and disposal. In Vietnam today, however, there exist neither a treatment facility nor a disposal facility for hazardous waste, and it is impossible to handle it in compliance with the Regulation.

A plan has been drawn up to construct treatment facilities for hazardous waste in three locations in Vietnam, but because there is no prospect of securing necessary foreign financial assistance, the construction is suspended. It will probably take much time before the completion of the facilities.

As mentioned earlier, waste is not subjected to separation before disposal, and hazardous waste, even when handled by waste disposal operators under contract, is simply dumped into disposal sites together with other types of waste. Such being the case, Japanese companies that generate sludge containing heavy metals have difficulty in treating and disposing of it. They have asked the Vietnamese Government to construct disposal facilities for hazardous waste early. In the mean time, they store waste containing hazardous material inside their own premises. Some of them export it to Japan after adjusting the concentrations of heavy metals and turning the waste into material of some monetary value. At any rate, more vigorous industrial activities will lead to increases in hazardous waste, and it seems inevitable in Vietnam that the waste will become an environmental challenge to be met urgently in the coming years.

For medical waste containing hazardous substances, incinerators are already installed in Hanoi and Ho Chi Minh City, and at some 30 large-scale hospitals in various parts of the country for incinerating this type of waste. One in Ho Chi Minh City has an incinerating capacity of 3.2 tons a day, incinerating medical waste collected from about 60 stations in the city.

5. Other Environmental Problems

Forest destruction is considered to be one of the most serious environmental problems in Vietnam. Causes include logging for fuel or other commercial purposes and slash-and-burn farming, but the principal cause is the Vietnam War. During the war, a large amount of defoliant was sprayed and huge areas of mangrove and other forests were destroyed. It also left dioxin-contamination behind it. Another possible cause of reduced mangrove forests is conversion to shrimp farms.

Other types of pollution have also become environmental problems, such as soil erosion due to typhoon or flooding; ground degradation caused by excessive ground use, including excessive multiple cropping; contamination of rivers, waterways, and seas with oil leaking from vessels for water-borne traffic; and road traffic noise resulting from an increasing traffic volume of automobiles and motorcycles.

Section 3
Environmental Policies and Legislation in Vietnam

1. Progress in Environmental Administration and Environmental Legislation Systems

(1) Environmental Administration and the Law on Environmental Protection (LEP)

In Vietnam, the National Plan for Environment and Sustainable Development 1991-2000 was formulated in 1991 as a master plan for environmental protection. This Plan triggered a series of environmental legislation and the formation of administrative bodies in Vietnam. The Plan, drawn up with the cooperation of the United Nations Development Plan (UNDP) and other organizations, proposed to the Vietnamese Government to (1) clarify environmental administrative authorities at central and local levels, (2) formulate environmental policy, laws, and regulations, and (3) establish environmental monitoring systems. In response, in 1992, the State Committee for Science and Technology was reorganized into the Ministry of Science, Technology and Environment (MOSTE). In the following year (1993), the National Environment Agency (NEA) was set up under the MOSTE as a working organization responsible for Vietnamese environmental administration. In each of the 57 provinces and the four cities under central government (Hanoi, Ho Chi Minh City, Hai Phong, and Da Nang), the Department of Science, Technology and Environment (DOSTE) was also formed as a local environmental administrative body under respective Provincial People's Committee.

At the same time, work was also done to develop a system of environmental legislation. First, in December 1993, as a basic framework for the country's environmental policy, the Law on Environmental Protection (LEP) was passed by the National Assembly, and put into effect in January 10, 1994. In October 1994, the Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No.175/CP) was enacted in order to carry out environmental policy based on the LEP. Together with this Decree, a large number of environmental legislation was enacted, each stipulating penalties for violating the provisions of environmental legislation, environmental impact assessments, and other matters. In 1995, environmental standards showing desired levels of air and water qualities and the Vietnam Standards (TCVN) specifying discharge standards for wastewater and emission were simultaneously established.

Until 1994, when the Law on Environmental Protection (LEP) become effective, there had been no legislation dealing with environmental problems comprehensively. There had indeed existed legislation intended for sanitation, health and other environmental matters, but because they were not intended for environmental protection, it was difficult under such legislation to take appropriate measures against pollution problems that occurred with economic development. For this reason, Hanoi and Ho Chi Minh City, where economic growth and industrialization took place earlier than in other parts of the country, had formulated their own rules for environmental protection to cope with pollution problems before LEP was put into effect. With the enactment of a series of environmental legislation, however, these cities are now coping with such problems uniformly under national environmental legislation.

Vietnam has thus steadily been establishing administrative and legislative systems for environmental protection as represented by the establishment of the Ministry of Science, Technology and Environment (MOSTE), and enactment of LEP, but it still faces a lot of challenges to be met for effective environmental control.

Even after the establishment of the Ministry of Science, Technology and Environment (MOSTE) and the National Environment Agency (NEA), a number of other ministries and agencies have exercised their respective authorities to get involved with environmental problems, diminishing the environmental control authorities of MOSTE and NEA. These ministries include the Ministry of Industry (MOI), with state-owned enterprises under its direction, the Ministry of Planning and Investment (MPI), regulating foreign investment, the Ministry of Construction (MOC), and the Ministry of Transportation and Communications, each having a say in environmental problems in its jurisdiction. This jurisdictional overlap is also the case with the Law on Environmental Protection (LEP) and other environmental legislation. It is necessary to remove jurisdictional overlap among a large number of laws related to environment under jurisdiction of various ministries and agencies.

Another big challenge to be met is the weakness of environmental administrative bodies, whether they are

at central level or local. NEA, with some 100 personnel and an annual budget of about 450 million yen only (for fiscal 2000; equal to 1/1,800 of the national budget of some 800 billion yen in terms of expenditures), suffers from chronic shortages of personnel and budgets. The problem is more serious with the Departments of Science, Technology and Environment (DOSTE), local environmental administrative bodies. Some DOSTEs other than in urban areas are not provided with sampling equipment, indispensable for on-site inspection of factories, because of shortages of funds. In addition, delayed construction of sewage and waste treatment facilities, indispensable for environmental protection, also constitutes an important cause of hindering environmental improvements in Vietnam.

(2) Environmental Administrative Bodies around the National Environment Agency (NEA) and Departments of Science, Technology and Environment (DOSTE)

In Vietnam, the Ministry of Science, Technology and Environment (MOSTE), inaugurated in 1992, supervises environmental administration, and under it, the National Environment Agency (NEA), set up in 1993, handles environmental protection and control affairs at national level. The National Environment Agency is single-handedly responsible for a range of functions relating to environmental protection and control. Its functions include the examination and submission of policies, legislation and documents relating to environmental protection; inspection for compliance with the Law on Environmental Protection (LEP); the review of environmental impact assessment reports; the prevention of environmental pollution; the handling of problems relating to environmental accidents and incidents; and the guidance of local environmental protection agencies.

The head office of the NEA, located in Hanoi, consists of 10 divisions. Among them, the Pollution Control, Waste Management and Environment Accidents Division supervises environmental control on industrial activities. The Environment Policy and Legislation Division is responsible for planning environmental policy and preparing long-term plans for environmental protection. The NEA also has a dedicated organization in it for issuing the Environment Protection Journal, a magazine providing environmental information for rural people otherwise having little access to such information.

The number of personnel working for the NEA was about 100 as of 2000, of which some 20 were specialists who graduated from universities or other professional schools.

At local level, the Departments of Science, Technology and Environment (DOSTE) are responsible for environmental administration: a total of 61 DOSTEs are set up in the provinces and the cities under central government. Each DOSTE issues Environmental Approval Certificates to factories, monitors river water and air qualities, implements control measures for wastewater, emission and waste discharged from factories, and enforces corrective measures on any entities that is found by on-site inspection to be in violation of environmental legislation. In addition, the DOSTE with jurisdiction over the area where factories are located is also the agency through which routine environmental control procedures are performed. Thus, the DOSTE is an administrative agency with which Japanese companies have a lot to do. The DOSTE, however, performs a wide range of functions relating to science, technology, quality measurement, communications, and information technology. Environmental administration is only one of such functions, so that the agency, suffering from chronic personnel and budgetary shortages, is unable to perform on-site inspection or the like, the basis for environmental control, as it wants.

In this survey, we visited the DOSTE of Hanoi and Ho Chi Minh City, both of which are relatively larger organizations with higher administrative capabilities compared with other DOSTEs. According to their explanation, the DOSTE of Hanoi is staffed with a total of some 150 personnel assigned to six sections, including science and technology, and quality measurement. The environmental control section, responsible for environmental affairs, has only 16 or so personnel working for it. Similarly, the DOSTE of Ho Chi Minh City has some 16 personnel assigned to the environmental section. These 16 personnel deal with some 20,000 factories, although another 50 or so officials are assigned to the districts of the city to handle environmental affairs there.

Despite the personnel shortages, the capabilities of the DOSTEs appear to be being enhanced, though

gradually. In the DOSTE of Hanoi, for example, an environmental technology transfer center will be opened before the end of 2002, making it possible to monitor the environment and evaluate the findings in-house without any further need to contract out to universities or other outside institutes.

Thus, the Vietnamese environmental administration, central or local, stands on a weak foundation, and for this and other reasons, effective environmental control is still to be ensured. To deal with this situation, the Vietnamese Government is now working on the improvement of its environmental administration system. A document entitled "the National Strategy for Environmental Protection 2001-2010", scheduled to be officially adopted before long, carries various plans that include forming a General Environmental Agency, a strengthened version of the present NEA, forming an independent Ministry of Environment, and establishing environmental administrative bodies in towns and villages in addition to the present provincial ones.

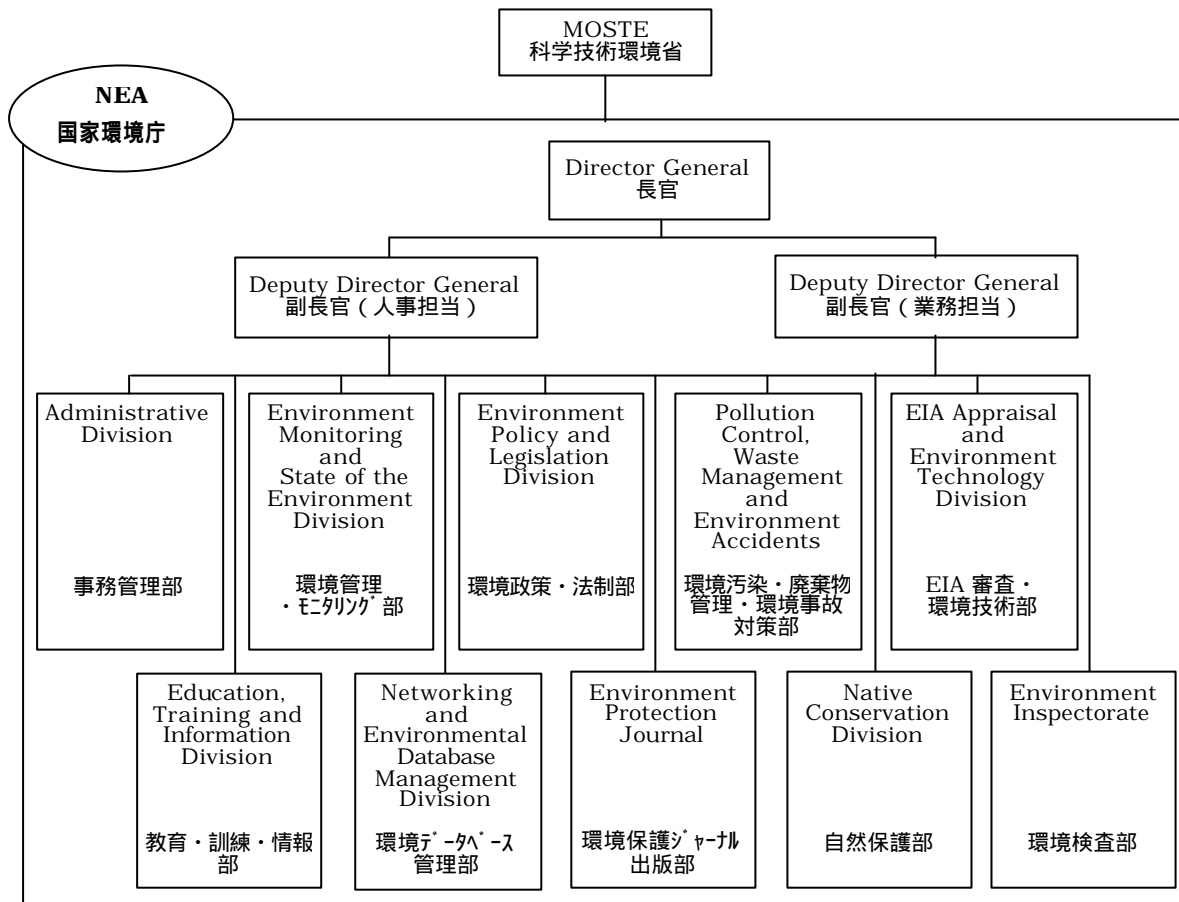
In Vietnam, the Ministry of Industry (MOI), into which the former Ministries of Heavy Industries, Light Industry and Energy were integrated in 1995, plays a part in dealing with environmental problems, mainly directing the state-owned enterprises to take measures against industrial pollution. Under the Ministry, the Technology and Production Quality Management Department and the Industrial Safety Engineering Supervision and Inspection Directorate, as administrators of the state-owned enterprises, make research into measures against industrial pollution, and assist existing factories in improving their production facilities and introducing cleaner production technology.

The Ministry of Industry (MOI) also cooperates with each Department of Science, Technology and Environment (DOSTE) at local level in performing on-site inspection of factories, and plays a part in the review of environmental impact assessment reports submitted prior to the opening of industrial estates. Like the Ministry of Science, Technology and Environment (MOSTE), however, MOI faces problems of insufficient financial resources and a lack of experience concerning measures against industrial pollution control. MOI is required to strengthen its capabilities to deal with industrial pollution caused by state-owned enterprises under its jurisdiction, a leading source of pollution in Vietnam.

Another organization dealing with industrial pollution problems is the Vietnam Standards Centre (VSC). This organization is under MOSTE, and is charged with responsibility of drafting and publishing Vietnam Standards (TCVN) for wastewater and emission. The Technology Committee, set up under the Center, prepares and revises the drafts of various environmental standards.

Local environmental administrative bodies are charged with the functions of collecting, treating and disposing waste, including industrial waste, but in most cases, public corporations, formed under the cities or provinces, perform such work. The Urban Environmental Company (URENCO) in Hanoi and the Public Services Company in Ho Chi Minh City perform every work from collection of waste to operation and management of waste treatment and disposal facilities.

Figure 1-3-1 Organizational Structure of the National Environment Agency (NEA)



(3) System of Environmental Legislation Relating to Industrial Pollution

Environmental control in Vietnam is based on the Law on Environmental Protection (LEP), put into effect in January 1994. LEP was formulated against the background of worsening problems of forest destruction and the like caused by the prolonged state of war and increasingly serious industrial pollution resulting from rapid economic development and industrialization.

Consisting of 7 chapters and 55 articles, LEP states in its preamble that "The environment is of special importance to the life of humans and other living creatures as well as to the economic, cultural and social development of the country, the nation and mankind as a whole."

In Article 2, it stipulates that the components of the environment are "air, water, soil, sound, light, the earth's interior, mountains, forests, rivers, lakes, sea, living organisms, ecosystems, population areas, production centers, nature reserves, natural landscapes, famed beauty spots, historical vestiges and other physical forms."

Article 16 makes it mandatory for all organizations and individuals in carrying out production, business and other activities to implement measures for environmental sanitation and have appropriate treatment equipment and technology for all forms of waste (solid, liquid and gaseous) to ensure compliance with environmental standards.

Article 17 requires, among other things, the submission of an Environmental Impact Assessment (EIA) report by all organizations and individuals that had begun various projects prior to the promulgation of

LEP. Article 18 requires such preparation by all organizations and individuals that start new projects. LEP also provides penalties for environmental pollution and for damages that may arise from such pollution.

The Law on Environmental Protection (LEP) gives the framework of Vietnamese environmental protection policy. Based on this Law, a large number of government decrees, ministerial ordinances, standards and others lay down specific provisions. Of particular importance are provisions of the Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No.175/CP), put into effect in October 1994. This Decree stipulates the division of authority among the Ministry of Science, Technology and Environment (MOSTE), the National Environment Agency (NEA) and local administrative agencies in Vietnamese environmental management. Government Decree No.175/CP also specifies the process of environmental impact assessment, the form and content of the environmental impact assessment report, and the division of authority between the central agency (MOSTE/NEA) and the local organization (Department of Science, Technology and Environment, DOSTE) with respect to the review of environmental impact assessment reports. The Decree also calls for the preparation of Vietnam Environment Standards showing specific standards for industrial pollution and others, illustrating 20 necessary types of such standards. On the basis of these standards, the Industrial Wastewater-Discharge Standards (TCVN 5945-1995) and the Industrial Emission Standards-Inorganic Substances and Dusts (TCVN 5939-1995), both detailed later, have been prepared.

Further, the Government Decree No.175/CP carries provisions for on-site inspection of factories and other facilities for compliance with environmental legislation. It also calls for the establishment of the environmental fund that will be managed as a fund source for promoting environmental protection. In addition, it gives standards for exhaust gas and noise from each unit of automobiles and other sources.

In 1996, the Government Decree on Sanctions against Administrative Violations in Environmental Protection (Government Decree No.26/CP) was issued, setting forth penalties for violators of environmental legislation. It stipulates various penalties, which include fines, the revocation of Environmental Approval Certificates, and the closing of factories. The maximum amount of fine set by the Decree is 100 million Vietnamese Dong (about 900,000 yen) for one oil spillage accident. The amount may be small to foreign companies, but the violator may be indicted on a crime and subjected to a lawsuit. In recent examples, one Taiwanese enterprise was ordered by the court to pay 16 billion Vietnamese Dong (about 140 million yen) in damages for violating a wastewater regulation.

Environmental impact assessment is a prerequisite for building a factory in Vietnam. It is required to be conducted basically in accordance with Articles 17 and 18 of the Law on Environmental Protection (LEP) and the Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No. 175/CP), as described earlier. In addition, some rules dealing with environmental impact assessment are also issued, including the Regulations and Organization of Appraisal Council on Environmental Impact Assessment Report and Issuing Environmental License (Decision No.1806/QD-MTg). Of these, the one closely related with Japanese companies is the Circular Letter of Guidance on Setting Up and Reviewing the Environmental Impact Assessment (EIA) Report for Investment Projects (Circular No.490/1998/TT-BKHCMNT) issued by the Ministry of Science, Technology and Environment (MOSTE) in April 1998. This Circular No.490/1998/TT-BKHCMNT was issued based on the policy of the Vietnamese Government for providing incentives to foreign investment. It simplifies the requirements for environmental impact assessment of an investment project that is classified by the Circular to be of little environmental impact. This type of project may complete the procedure for environmental impact assessment (EIA) simply by submitting to the MOSTE or DOSTE the Registration for Securing Environmental Standards, accompanied by documents detailing the project site, possible sources of environmental pollution, and pollution control measures to be taken, and a letter pledging to comply with environmental standards. Most Japanese companies who plan to move into an industrial estate will be subject to the provisions of this Circular No.490/1998/TT-BKHCMNT.

In Vietnam, there used to be few pieces of legislation that were concerned with waste, except some provisions in the Law on Environmental Protection (LEP). In July 1999, however, the Regulation on Hazardous Waste Management (Decision No.155/1999/QD-TTg) was promulgated in the name of the Prime Minister. This Regulation sets forth the definition of hazardous waste, the responsibilities of both polluters and relevant ministries and agencies, and regulations for collection, transportation, storage, treatment, disposal and emergency measures for hazardous waste, with its annex specifying treatment and disposal methods for hazardous waste.

Figure 1-3-2 Environmental Legal Documents and Quality Standards

Legal Documents / 主な法規
Law on Environmental Protection 環境保護法
Government Decree No.175/CP on Providing Guidance for the Implementation of the Law on Environmental Protection 環境保護法実施のための政令 (Government Decree No.175/CP)
Government Decree No.26/CP on Sanctions Against Administrative Violations in Environmental Protection 環境保護に関する行政違反に対する制裁に関する政令 (Government Decree No.26/CP)
Circular Letter of Guidance on Setting Up and Reviewing the Environmental Impact Assessment(EIA) Report for Investment Projects (No.490/1998/TT-BKHCMNT) 投資プロジェクトのための環境影響評価報告書の審査等についての回状 (Circular No.490/1998/TT-BKHCMNT)
Regulation on Hazardous Waste Management (Decision No.155/1999/QD-TTg) 有害廃棄物管理規則 (Decision No.155/1999/QD-TTg)
Air Quality Standards / 大気に関する基準
TCVN 5937-1995 : Air quality-Ambient air quality standards 大気環境基準 (TCVN 5937-1995)
TCVN 5938-1995 : Air quality-Maximum allowable concentration of hazardous substances in ambient air 大気中有害物質の最大許容濃度 (TCVN 5938-1995)
TCVN 5939-1995 : Air quality-Industrial emission standards-Inorganic substances and dusts 産業からの無機物質及びばいじん等の大気排出基準 (TCVN 5939-1995)
TCVN 5940-1995 : Air quality-Industrial emission standards-Organic substances 産業からの有機物質の大気排出基準 (TCVN 5940-1995)
Water Quality Standards / 水質に関する基準
TCVN 5942-1995 : Water quality-Surface water quality standards 表流水水質環境基準 (TCVN 5942-1995)
TCVN 5943-1995 : Water quality-Coastal water quality standards 沿岸海水水質環境基準 (TCVN 5943-1995)
TCVN 5944-1995 : Water quality-Ground water quality standards 地下水水質環境基準 (TCVN 5944-1995)
TCVN 5945-1995 : Industrial waste water-Discharge standards 産業排水基準 (TCVN 5945-1995)

Sources : brochure published by NEA, list of current environmental TCVNs printed by VSC

Environmental standards giving desirable environmental levels as in Japan, and discharge standards applied in specific industrial pollution control are contained in nearly 10 pieces of Vietnam Standards (TCVN), each enacted in 1995. Examples of environmental standards indicating desirable environmental levels include Ambient Air Quality Standards (TCVN 5937-1995), Surface Water Quality Standards (TCVN 5942-1995), and Coastal Water Quality Standards (TCVN 5943-1995). Examples of specific discharge standards for factories and the like include Industrial Emission Standards-Inorganic Substances and Dusts (TCVN 5939-1995) and Industrial Wastewater Standards-Discharge Standards (TCVN 5945-1995). These TCVNs are the basis for environmental control in Vietnam, and at the same

time serve as guides to environmental impact assessment.

Work is now under way on the revision of LEP and the wastewater and emission discharge standards, because considerable time has elapsed since their enforcement and the circumstances surrounding environmental control have been changing with economic development.

(4) Environmental Procedures Required of Businesses Entering Vietnam

When moving into Vietnam by constructing a factory or the like, the procedure for environmental impact assessment is indispensable in addition to applying for an investment license. It is because the Environmental Approval Certificate, obtainable only through such procedure, is required to obtain the building permit for constructing a factory.

In the environmental impact assessment procedure, an environmental impact assessment report needs to be prepared, basically in accordance with Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No.175/CP). In Vietnam, for the purpose of encouraging foreign investment, a simplified procedure for environmental impact assessment is laid down in the Circular Letter of Guidance on Setting Up and Reviewing the Environmental Impact Assessment (EIA) Report for Investment Projects (Circular No.490/1998/TT-BKHCMNT).

This Circular Letter classifies large-scale projects that may have a wide range of environmental impact as Category 1, and small-scale projects of little environmental impact as Category 2.

When a project falls under Category 2, the entity concerned may complete the environmental impact assessment procedure by submitting the simplified Registration for Securing Environmental Standards to the Ministry of Science, Technology and Environment (MOSTE) through the National Environment Agency (NEA) or the relevant Department of Science, Technology and Environment (DOSTE).

The documents to accompany the Registration form include: 1) an explanation of the planned site for the project, 2) an outline of production technology involved, 3) an outline of possible pollution sources, 4) an outline of pollution control measures to be taken, 5) a plan for environmental monitoring, and 6) a letter pledging to comply with applicable environmental standards.

The environmental administrative body that received the Registration for Securing Environmental Standards reviews the documents submitted, and decides whether or not to issue an Environmental Approval Certificate. At the time of issuing such Certificate, the administrative body indicates which category of effluent standards, etc. applies to the project concerned.

After being granted the Environmental Approval Certificate, the entity implementing the project is required to report the result of monitoring environmental conditions once every three months in the initial year, and once every six months from the following year and on. In addition, during these years, the project may also undergo on-site inspection by the relevant environmental administrative body.

To install wastewater treatment facilities or waste treatment equipment on the premises of the factory, the entity needs to submit an application for the issuance of a Pollution Certificate to the relevant environment administrative body within half a year of the commencement of operation. After obtaining the Pollution Certificate, the entity needs to obtain the Environmental Certificate. Both Certificates expire in certain periods of time and need to be renewed.

On the other hand, when a project falls under Category 1 (projects of large environmental impact) as specified in the Circular No.490/1998/TT-BKHCMNT, the entity including a foreign investor is required to prepare a full-fledged environmental impact assessment report for review by the relevant environmental administrative body.

Japanese companies often locate their sites in an industrial estate or export-processing zone. These estates or zones usually finished the environmental impact assessment for the whole of the estate or zone when it was built. Therefore, any project located in such estate or zone will automatically be classified as Category , allowing the entity implementing the project to complete the environmental impact assessment by the simplified procedure of submitting the Registration for Securing Environmental Standards.

Section 4
Water Pollution Management

1. Water Pollution Control in Vietnam

The problem of water pollution in Vietnam has been becoming more serious annually with the rapid economic development. In response, the Vietnamese Government has embarked on mitigating water pollution problems through the establishment of environmental standards for water quality and industrial effluent standards. Despite these efforts, however, the construction of treatment facilities for both domestic and industrial wastewater is delayed. The National Environment Agency (NEA), and the Departments of Science, Technology and Environment (DOSTE), located in various parts of the country for local environmental administration, are suffering from a lack of administrative capabilities. As a result, effective water quality control can hardly be enforced. But as wastewater is easier to measure than gaseous emission, higher priority is assigned to water quality control in environmental administration among various targets of environmental control. In fact, on-site inspection for wastewater is conducted, particularly at facilities of foreign companies, and some, not Japanese ones, are reported to have been accused of violation of wastewater legislation.

As specific standards for water quality control in Vietnam, there are four Vietnam Standards (TCVN), based on the Law on Environmental Protection (LEP) and the Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No.175/CP). Of the four, those comparable to the Japanese environment standards are Surface Water Quality Standards (TCVN 5942-1995)(see Reference 5), Coastal Water Quality Standards (TCVN 5943-1995) and Ground Water Quality Standards (TCVN 5944-1995). The three are not standards by which to exert direct control on factory wastewater, but give guidelines for desirable water qualities. The representative of the three is TCVN 5942-1995 (Surface Water Quality Standards), which divide applicable water bodies into two categories. One is Category A, water from which is subjected to treatment appropriate for the intended use and then used for domestic purposes, and the other, Category B, water from which is used for purposes other than domestic use. Under the heading of each Category, permissible upper limits for 31 different substances are given as environmental standards.

On the other hand, effluent standards, which will significantly affect the operations of Japanese companies, are laid down in the Industrial Wastewater-Discharge Standards (TCVN 5945-1995), details of which are given in the section that follows. In TCVN 5945-1995, wastewater is classified into three categories based on the water bodies to which it is discharged. Permissible upper limits are specified for wastewater of each category with regard to 33 items starting with general items such as temperature and COD (Chemical Oxygen Demand), and covering various substances ranging from heavy metals, and organochlorine compounds such as trichloroethylene, to radioactive substances. See Figure 1-4-1 for specific standards. Three categories are as follows. Category A represents wastewater discharged into water bodies from which domestic water is taken. Category B is wastewater discharged into water bodies used for transportation, irrigation, fishing, or bathing. Category C is wastewater discharged into water bodies specifically designated by relevant administrative bodies. These Standards are applied uniformly across the nation according to the conditions of water bodies into which wastewater is discharged. They do not discriminate one line of business from others. Even a line of business where it is difficult to take effective wastewater measures is required to comply with the same Standards.

The current Industrial Wastewater-Discharge Standards (TCVN 5945-1995) have a lot of problems. They specify very stringent standards for ammonia nitrogen and some heavy metals, requiring factory operators to address difficult technical challenges for meeting the standards. For some substances such as phenol, they require extremely low standards, so low as to make analyzing it difficult. In addition, the Department of Science, Technology and Environment (DOSTE) of each locality is authorized to set standards for additional items not covered in the Vietnam Standards (TCVN) according to local conditions. Some Japanese companies are additionally required to meet standards for electric conductivity and other items not specified in TCVN 5945-1995 (Industrial Wastewater-Discharge Standards).

The current Industrial Wastewater-Discharge Standards (TCVN 5945-1995) were established more than seven years ago, in 1995. Since then, the circumstances surrounding water quality control has gone

through great changes. For example, when the current standards were established, there existed few industrial estates, which presently constitute the main locations for foreign companies moving into Vietnam. In addition, it is pointed out that most of the current environmental standards in Vietnam were borrowed without adjustment from Western countries located in the temperate zone, and are not suitable for the climatic conditions of Vietnam, part of which lies in the tropical zone.

To cope with these problems, the Vietnamese Government is now working to revise the Industrial Wastewater-Discharge Standards (TCVN 5945-1995) along with the Law on Environmental Protection (LEP). Basically, the Government is aiming to revise them in line with the reality of the country. In addition, the Government is likely to introduce the idea of controlling area-wide total pollutant load, in addition to the current control based on concentration levels, in order to achieve effective wastewater control according to the conditions of water bodies into which wastewater is discharged and the location of a factory. However, a major problem will remain unsolved even after the Industrial Wastewater-Discharge Standards are revised. Factories that are subjected to the Standards are those that have commenced operations since the LEP became effective. Most of the state-owned enterprises established long time ago are not subjected to the Standards, despite large water pollution loads they discharge.

2. Specific Wastewater Control Imposed on Factories

Figure 1-4-1 compares Industrial Wastewater-Discharge Standards (TCVN 5945-1995) in Vietnam with national standards of Japan. These standards are permissible upper limits in wastewater. In Vietnam, 33 items are subjected to control. Most of them are also controlled in Japan, but there are several items not controlled in Japan, but controlled in Vietnam such as residual chlorine, nickel and tin. Conversely, the Japanese standards contain more than 10 items not controlled in Vietnam such as organic chlorine compounds, although they are not included in this Figure.

The levels of water quality are classified into Categories A, B and C according to the water bodies into which industrial wastewater is discharged. Category A denotes water bodies used as sources of domestic water, Category B, water bodies used for agriculture, fishing and similar purposes, and Category C, water bodies used for other purposes. Category A is subjected to the most stringent standards; Category C to the least stringent ones.

At the time of issuing the building permit for a factory, the National Environment Agency (NEA) or the local environmental administrative body, the Department of Science, Technology and Environment (DOSTE), designates the applicable category. According to the findings in this survey obtained by visiting the factories of Japanese companies, there are no factories to which the standards under Category C are applied, and all of the factories are subjected to those under either Category A or B.

Some Japanese companies are at a loss because, although located downstream of the intake point for a waterworks, they are required to meet the standards under Category A. A responsible official of the Vietnamese Government explained, however, that there are a lot of water bodies from which residents living nearby directly take their domestic water and that Category A includes these water bodies as well. As long as this interpretation applies, Category A will naturally extend to a wide range of water bodies.

In the construction of a factory or the like in an industrial estate, the management company of the estate will designate the category applicable for the entity implementing a certain project, as instructed by the relevant environmental administrative body beforehand.

When the industrial estate is equipped with a central wastewater biological treatment facility, it is assumed that BOD, COD and suspended matter are dealt with in that central facility, and individual factories in the estate are required to meet less stringent standards in their primary wastewater treatment than those set in the Industrial Wastewater-Discharge Standards (TCVN 5945-1995). Usually, Category-C levels of standards are applied. For heavy metals and other hazardous substances that can not be treated in the central facility, however, they are required to meet the original standards applicable to the category of the water body involved.

Compared with the national standards of Japan, those under Categories A and B in Vietnam are more stringent for most of the items. The items to which particularly stringent standards apply are COD, ammonia nitrogen, cyanides, zinc, nickel, fluorine compounds, and phenol.

The COD standard of 50mg/liter under Category A is extremely stringent. The value is not only stringent compared with 160mg/liter applicable in Japan, but also measured by a different method. While in Japan oxidation reaction with potassium permanganate is used to find the amount of oxygen required for oxidation (COD_{Mn}), oxidation reaction with potassium dichromate is used in Vietnam for the same purpose (COD_{Cr}). Since potassium dichromate is more oxidative, the Vietnamese method gives a higher value for the same sample. Though varying from sample to sample, the COD_{Cr} value is about 2.5 times the COD_{Mn} value. This means that the Japanese standard of 160mg/liter is equivalent to about 400mg/liter as determined by the Vietnamese method. Therefore, the Vietnamese standard of 50mg/liter is equivalent to about 1/8 of the Japanese standard, which means that any wastewater treatment equipment meeting the Japanese standards as determined by the COD_{Mn} method can not necessarily satisfy the Vietnamese standard if brought into the country as it is.

It is technically difficult to meet the ammonia nitrogen standard of 0.1mg/liter under Category A. Given the fact that the concentration of ammonia nitrogen in river water used by residents living along the river is in the neighborhood of 1mg/liter, it is difficult to give a reasonable explanation of this standard. How stringent this Vietnamese standard is can be understood by comparing it with the corresponding Japanese standard of 120mg/liter for total nitrogen that includes ammonia nitrogen.

The cyanides (CN) standard of 0.05mg/liter under Category A is stringent. It is 1/20 of the Japanese standard of 1.0mg/liter. Cyanogen is decomposed by oxidation reaction when the pH value and oxidation-reduction potential are controlled within proper ranges. If this control fails, cyanogen produces a poisonous gas, or wastewater not meeting the standard is allowed to flow out. Any equipment for this treatment needs to be operated by trained personnel with meticulous care.

The zinc (Zn) standard of 1mg/liter under Category A is also stringent. It is 1/5 of the Japanese standard of 5mg/liter. Zinc is an amphoteric metal, and dissolves not only in acids and but also in strong alkalis. Because of this property, any wastewater treatment equipment must be operated while controlling the pH value within a very narrow range in order to remove zinc in the form of water-insoluble hydroxide and achieve this concentration level.

The nickel (Ni) standard of 0.2mg/liter under Category A is difficult to meet using conventional wastewater treatment technology. A sophisticated treatment method such as the ion exchange resin method is required to meet this standard. In Japan, this element is not subjected to control, but is being monitored to see its trend.

The fluorine compounds standard of 1mg/liter under Category A is also very stringent. In Japan, the corresponding standard was made more stringent just in 2001, lowering from 15mg/liter to 8mg/liter.

The phenol standard of 0.001mg/liter and 0.05mg/liter under Categories A and B respectively is very stringent compared with the Japanese standard of 5mg/liter. These levels of concentration are so low that it is difficult even to analyze.

Facing these standards that appear to be unreasonably stringent, some Japanese companies have managed to get them eased through negotiations with the relevant environmental administrative body. This shows that it is important to explain the exact reason why the limits are unreasonable to the authorities concerned.

Besides the above-mentioned 33 items, some Japanese factories are required to meet the standards for additional items, including electric conductivity and transparency, as the relevant Department of Science, Technology and Environment (DOSTE) is authorized to increase the control items according to the

conditions of the locality under its jurisdiction. In doing so, DOSTE is required to follow the examples of foreign countries as to control items to be added and their standards. For instance, the standard for electric conductivity is determined on the basis of that for salinity in wastewater used by the Government of Thailand, an agricultural country, to prevent salt damage to paddy fields.

Generally, standards for wastewater in developing countries are more stringent than Japanese ones, because, it is said, they investigate the standards of advanced countries in the West and adopt the most stringent ones.

For setting standards, European and North American countries adopt concentration levels that can be achieved by the Best Available Technology (BAT). In contrast, Japan first sets environmental standards, and then taking into consideration the dilution and natural purification effects, determines the effluent standards that can satisfy the environmental standards. For example, when Japan set the nitrogen standard, decomposition by microorganisms in nature was taken into consideration. As a result, the standard was set at total nitrogen of 120mg/liter as mentioned earlier. In contrast, many Western countries set the corresponding standard at 10mg/liter because that standard is achievable by using oxidation treatment or other technology.

The basic thinking in European and North American countries is that any substance harmful to the environment should never be discharged regardless of the present level of environmental pollution. Following the examples of such Western countries, where chlorine is subjected to stringent control, the Vietnamese Government sets the standard for residual chloride (also known as free chlorine) at a stringent level of 1mg/liter. In Japan, where there are no signs of environmental pollution caused by chlorine, the element is neither an item of control nor that of monitoring. Japanese people, accustomed to the odor of chlorine used to sterilize tap water and water in swimming pools, are puzzled by such stringent limits. As long as developing countries control wastewater on the basis of the Western thinking, Japanese companies moving into there must basically follow such policy.

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

(Unit: mg/liter unless otherwise indicated)

Country		National Standards			
		Vietnam(TCVN 5945-1995)			Japan ⁴⁾
		A ¹⁾	B ²⁾	C ³⁾	
1	Temperature/温度()	40	40	45	-
2	pH	6 - 9	5.5 - 9	5 - 9	5.8 - 8.6 (other than sea) 5.0 - 9.0(sea)
3	BOD ₅ (20)	20	50	100	160 (daily average : 120)
4	COD	50	100	400	160(COD _{Mn}) (daily average : 120)
5	Suspended solids/ 懸濁物質	50	100	200	200 (daily average : 150)
6	Mineral oil and fat/鉱物油	N.D.	1	5	5
7	Animal - vegetable fat and oil/ 動植物油	5	10	30	30
8	Total nitrogen/全窒素	30	60	60	120
9	Ammonia (as N)/ アンモニア性窒素	0.1	1	10	⁵⁾
10	Residual Chloride/残留塩素	1	2	2	-
11	Cyanide/シアン化合物	0.05	0.1	0.2	1.0
12	Total phosphorous/全りん	4	6	8	16

13	Organic phosphorous/ 有機性りん	0.2	0.5	1	1
14	Arsenic/ヒ素	0.05	0.1	0.5	0.1
15	Cadmium/カドミウム	0.01	0.02	0.5	0.1
16	Lead/鉛	0.1	0.5	1	0.1
17	Chromium ()/6価クロム	0.05	0.1	0.5	0.5
18	Chromium ()/3価クロム	0.2	1.	2	(Total 2)
19	Copper/銅	0.2	1	5	3
20	Zinc/亜鉛	1	2	5	5
21	Manganese/マンガン	0.2	1	5	10
22	Nickel/ニッケル	0.2	1	2	-
23	Iron/鉄	1	5	10	10
24	Tin/スズ	0.2	1	5	-
25	Mercury/水銀	0.005	0.005	0.01	0.005
26	Tetrachlorethylene/ テトラクロロエチレン	0.02	0.1	0.1	0.1
27	Trichlorethylene/ トリクロロエチレン	0.05	0.3	0.3	0.3
28	Fluoride/フッ素化合物	1	2	5	8
29	Phenol/フェノール	0.001	0.05	1	5
30	Sulfide/硫黄化合物	0.2	0.5	1	-
31	Coliform/ 大腸菌群 (MPN/100ml)	5000	10000	-	3000
32	Gross activity/ 全アルファ線強度 (Bq/l)	0.1	0.1	--	-
33	Gross activity/ 全ベータ線強度 (Bq/l)	1.0	1.0	-	-

- 1) When discharged into water bodies from which domestic water is taken.
- 2) When discharged into water bodies used for transportation, irrigation, fishing, or bathing.
- 3) When discharged into water bodies specifically designated by relevant administrative bodies.
- 4) Excerpt from the 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)
- 5) $(\text{NH}_3\text{-N} \times 0.4 + \text{NO}_2\text{-N} + \text{NO}_3\text{-N}) \leq 100\text{mg/liter}$

Section 5
Air Pollution Management

1. Air Pollution Control in Vietnam

Air pollution control in Vietnam, like water quality control, is based on four Vietnam Standards (TCVN), formulated on the basis of the Law on Environmental Protection (LEP) and the Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No.175/CP). Of the four Standards, two give guidelines for desirable atmospheric environment, which occupy the position comparable to what are called the environmental standards in Japan. The remaining two specify standards for air pollutants discharged from factories or the like.

Those comparable to the Japanese environmental standards are Ambient Air Quality Standards (TCVN 5937-1995) and Maximum Allowable Concentration of Hazardous Substances in Ambient Air (TCVN 5938-1995). The former Standards specify upper limits in terms of hourly average and 24-hour average (8-hour average as well for CO) to be met for securing desirable atmospheric environment, for six different substances; CO (carbon monoxide), NO₂ (nitrogen dioxide), SO₂ (sulfur dioxide), lead, O₃ (ozone), and suspended particulate matter. Similarly, the latter Standards specify allowable concentrations in atmosphere in terms of 24-hour average and maximum level for 38 different substances, including ammonia, hydrogen chloride and hydrogen sulfide. These two Standards are not directly applied to control air pollutants discharged from factories but indicate the concentrations of those substances to be met for securing desirable atmospheric environment in Vietnam.

On the other hand, specific air pollution control of factories and other industrial facilities are based on Industrial Emission Standards-Inorganic Substances and Dusts (TCVN 5939-1995) and Industrial Emission Standards-Organic Substances (TCVN 5940-1995).

Of particular importance to air pollution control measures taken by Japanese companies is Industrial Emission Standards-Inorganic Substances and Dusts (TCVN 5939-1995). The Standards classify industrial facilities into Category A (existing factories and others already in operation prior to the effective date of the LEP) and Category B (new facilities commencing operations after the effective date). They specify emission standards for 19 different substances, such as particulate and gaseous air pollutants, for each Category. For specific emission limits, see Figure 1-5-1.

New facilities under Category B are subjected to more stringent standards, as expected, and these more stringent limits apply to a majority of the Japanese companies, which have moved into Vietnam since the enforcement of the LEP.

The other emission standards, or Industrial Emission Standards-Organic Substances (TCVN 5940-1995) specify the maximum allowable concentrations for 109 different hazardous chemical substances contained in emission gases. These Standards need to be complied with, and most of the Japanese companies comply with them. In practice, however, Vietnamese environmental administrative bodies are not enforcing these Standards partly because there are too many substances subjected to control, and many of them are difficult to analyze. In Section 2 below, therefore, we give detailed information only on Industrial Emission Standards-Inorganic Substances and Dusts (TCVN 5939-1995), which has a lot to do with air pollution control measures now being implemented by Japanese companies. Information on how to deal with these standards is also given.

In addition, with the economic development, the numbers of motorcycles and automobiles are increasing sharply in Vietnam, and air pollution caused by exhaust gases from these mobile sources has become a social issue, especially in urban areas. In order to cope with this situation, the Appendix to the Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No.175/CP) specifies standards for each unit of vehicle for CO, HC (hydrocarbons), and NO_x (nitrogen oxides) discharged from motor vehicles. Besides, the Vietnamese Government has been promoting the introduction of lead-free gasoline as a measure against lead in exhaust gases, and a complete switch to lead-free gasoline was completed in July 2001 across the nation.

2. Specific Emission Control for Factories

Industrial Emission Standards-Inorganic Substances and Dusts (TCVN 5939-1995) are outlined in Figure 1-5-1. Standards are given under two Categories A and B for 19 control items. Those under Category A apply to existing industrial facilities, and those under Category B to new ones. Compared with comparable Japanese standards, the standards under Category A are lenient, while those under Category B are almost at the same levels.

Dust is classified into two groups; particle in combustion exhaust gases, and dust containing silica or asbestos. These two groups are subjected to different standards. Substances not controlled in Japan such as antimony, chlorine compounds, and carbon monoxide are controlled in Vietnam.

The standard for sulfur dioxide (SO₂) is set at 1,500mg/m³ under Category A and 500mg/m³ under Category B. A number of Japanese factories equipped with heavy oil-fired equipment such as private diesel power generators and steam boilers may find these standards to be challenging, considering the quality of fuel oils available in Vietnamese domestic markets.

Vietnam is an oil producing country, but has no refinery within the country (one under construction). All domestically produced crude oil is exported to obtain foreign currency, while heavy oil of inferior quality, with high sulfur contents, is imported.

Unlike in Japan, where heavy oils are classified into fuel oils A through C, only one type of heavy oil is imported and available in Vietnam. This type, with a sulfur content of 3%, necessarily produces sulfur dioxide upon burning at a concentration of about 5,000mg/m³ (at an excess air ratio of 1.15) in emission gas. To meet the standard under Category A, desulfurization equipment must be installed and operated under careful control. Given the present size of Japanese factories, however, desulfurizing these emission gases is too costly and not realistic, and they have difficulty in dealing with the emission gas. In Japan, factories of similar size are required to use a fuel oil of low sulfur content in accordance with its area-wide total pollutant load control standards.

One type of low-sulfur fuel oil available in Vietnam is light oil, which costs 3,616 Vietnamese Dong/kg (about 32 yen/kg), compared to 2,515 Vietnamese Dong/kg (about 22 yen/kg) for heavy oil (as of 2001). Considering also that the price for light oil is about one half of that in Japan, heavy oil should be switched to light oil, which has low sulfur content, as would be required in Japan. Even if this switch involves some modifications to the existing equipment, the standards of the country into which any entity has moved should be complied with.

The standard under Category B (new facilities) for nitrogen oxides (NO_x) is set at 1,000mg/m³ (about 475 ppm). Some Japanese companies have difficulty in meeting this limit. When factories are using light oil-fired private diesel generators, it is difficult to meet the limit, which is very stringent compared with the 950 ppm set by the Air Pollution Prevention Law of Japan in 1986 for similar diesel engines. The Vietnamese Government set this limit in 1995. Prior to that time, there was no limit set for NO_x. This means that Japanese companies that drew up plans to move into Vietnam prior to 1995 had no knowledge that such stringent limit would be eventually specified. They must have decided that equipment capable of meeting the national standard set by the Japanese Government would be enough in Vietnam as well.

In the 1990s, however, some Japanese municipalities set a limit of 500 ppm, more stringent than the national standard. To meet this limit, some factories in Japan are equipped with ammonia-based NO_x removal equipment. Compared to this limit in some Japanese urban municipalities, the Vietnamese standard of 475 ppm is not exorbitant.

Dioxins, though not among the control items presently, are expectedly subjected to some standard sooner or later, most probably in the neighborhood of about 1ng/m³ following the examples of advanced nations. Any company planning to move into Vietnam should consider control measures for dioxins.

Generally speaking, developing countries often make an extensive study of emission standards of advanced nations and adopt the most stringent standard when they set their own. Vietnam is no exception and some of their emission standards are more stringent than the national standards of Japan. Japanese companies planning to move into developing countries that are yet to set emission standards should consider environmental measures that meet the most stringent emission standards in the world. Compared with other countries, the national standards of Japan are by no means the most stringent. Even when Japanese companies are planning to move into a developing country, they must not make light of emission control measures. When they want to establish factories overseas, they should consider measures for controlling emission from an international perspective. If a more stringent standard is set after the commencement of factory operations, new emission treatment equipment capable of meeting the new standard should be installed. This would certainly be a step to be taken when a factory is located in Japan.

Figure 1-5-1 Comparison of Vietnam's and Japan's Industrial Emission Standards

Parameter \ Country		National Standards		
		Vietnam(TCVN 5939-1995)		Japan ³⁾
		A ¹⁾	B ²⁾	
1	Particulate in smoke of:			30 - 250 ⁴⁾
	- heating of metals	400	200	
	- asphalt concrete plant	500	200	
	- cement plant	400	100	
	- other sources	600	400	
2	Dusts:			
	- containing silica	100	50	-
	- containing asbestos	none	none	-
3	Antimony/アンチモン	40	25	-
4	Arsenic/ヒ素	30	10	-
5	Cadmium/カドミウム	20	1	1.0
6	Lead/鉛	30	10	10, 20, 30 ⁴⁾
7	Copper/銅	150	20	-
8	Zinc/亜鉛	150	30	-
9	Chloride/塩素化合物	250	20	-
10	HCl/塩酸	500	200	80, 700 ⁴⁾
11	Fluoride, HF (any source)/フッ素化合物	100	10	1 - 20 ⁴⁾
12	H ₂ S/硫化水素	6	2	-
13	CO/一酸化炭素	1500	500	-
14	SO ₂ /二酸化硫黄	1500	500	K value standard, Total mass emission control standard, Fuel standard
15	NO _x (any source)/窒素酸化物(全ての発生源)	2500	1000	120 - 1,640 ⁴⁾
16	NO _x (acid manufacturing)/窒素酸化物(酸製造施設)	4000	1000	
17	H ₂ SO ₄ (any source)/硫酸(すべての施設)	300	35	-
18	HNO ₃ /硝酸	2000	70	-
19	Ammonia/アンモニア	300	100	-

1) Applied to the existing sources

2) Applied to all sources imposed from the date which stated by environmental authority

3) Excerpt from Air Pollution Control Law

4) It is decided by the type and scale of the source.

Section 6
Industrial Waste Management

1. Challenging Industrial Waste Problems in Vietnam

While the volume of wastes is increasing annually in Vietnam with the economic development, progress in constructing treatment and disposal facilities for both domestic waste and industrial waste is slow. Wastes are expected to become a big industrial challenge in coming years.

What is more, almost no legislation governing waste treatment has so far been enacted. The only piece of legislation related to waste management, except for environmental ideals set forth in the Law on Environmental Protection (LEP) and other laws, would be the Directive of the Prime Minister on Urgent Measures to Manage Solid Wastes in Urban and Industrial Districts (Directive No.199/TTg) issued in 1997.

In Vietnam, industrial wastes of monetary value, such as glass, metals, plastics, cardboard, and wood, are usually collected by waste recycling operators for recycling or reuse. For hazardous industrial wastes, including sludge resulting from wastewater treatment, there is no treatment facility or disposal facility available in Vietnam now. Contract waste recycling operators entrusted with industrial waste disposal most often hauls it together with domestic waste to a landfill disposal site, where it is dumped without any treatment. Such being the case, while mounting hazardous industrial wastes are threatening to cause environmental pollution, a lot of Japanese companies, active in implementing environmental measures, have difficulty in disposing of hazardous industrial wastes they generate. Some of them are planning to request the Vietnamese Government to construct treatment facilities for hazardous industrial wastes as early as possible.

Under these circumstances, the Vietnamese Government started to tackle the hazardous industrial waste problem, and has made a plan to construct hazardous waste disposal facilities. In 1999, the Government promulgated Regulation on Hazardous Waste Management (Decision No.155/1999/QD-TTg), specifying treatment and disposal methods for hazardous wastes. Details of this regulation are given Section 2 below. Thus, the Government, despite a lot of challenges facing it, including underdeveloped treatment and disposal facilities, has finally embarked on implementing hazardous waste control measures.

2. Promulgation of Hazardous Waste Management Regulation

As mentioned above, the Vietnamese Government promulgated Regulation on Hazardous Waste Management (Decision No.155/1999/QD-TTg) in 1999. The Regulation includes a definition of hazardous waste, responsibilities of relevant ministries and agencies, responsibilities of its generator, a certification system for entities hauling, treating and disposing of it, a manifest system under which to haul it, and emergency measures, thus making the Regulation a well-developed one. Its Annex specifies detailed classifications of hazardous wastes, treatment standards, and treatment and disposal methods for waste in each classification. The outline is shown in Figure 1-6-1.

In this Regulation, hazardous wastes are classified into List A waste and List B waste. List A contains hazardous wastes; List B non-hazardous wastes. Hazardous wastes in List A are subdivided into four classifications of A1 through A4, each of which is further subdivided for a total of 58 classifications. The wastes called specially controlled industrial wastes in Japan are all included in List A. In Vietnam, these wastes are defined on the basis of the concentration of a hazardous component in waste, the place where waste is generated (e.g., metal pickling facilities), or the property specific to waste (e.g., explosive substances). Treatment and disposal methods are specified for each classification.

For example, the waste classified as A1020 Y26 in Figure 1-6-1 is the one that contains cadmium with a concentration of more than 0.1%. The Figure shows that, when the waste has a high concentration of cadmium, it shall be processed to recover metal and, when the waste is in the form of acidic or alkaline aqueous solution, it shall be neutralized and stabilized as hydroxide.

The waste that contains hexavalent chromium of more than 1% is classified as A1040 Y21, and its reduction treatment is obligated. However, even when the concentration is less than 1%, for example,

0.8%, if the waste is subjected to the elution test conducted in Japan to decide whether the waste may be dumped at a landfill disposal site, the concentration in the eluate from the waste will obviously far exceed the Japanese standard of 1.5mg/liter. This Vietnamese standard is extremely lenient.

The waste acid from metal pickling that has a pH value of less than 2 is classified as A1060 Y34, and must be treated by oxidation or reduction and then neutralized. This is all that is stipulated, and there is no stipulation as to what to do with sludge necessarily generated upon neutralization, despite the fact that stabilization is necessary to prevent the elution of heavy metals from the sludge. It is also necessary to stipulate how to decide whether the sludge is stabilized and how to conduct its final disposal, but there is no stipulation for such matters. Since a usual way to judge whether sludge is stabilized is an elution test, the test method and criteria for judgement must be identified. Further, since the sludge needs to be separated from groundwater even after stabilized, it must be finally disposed of at a controlled landfill site. Nevertheless, there is no such stipulation.

Waste glass from cathode ray tubes is classified as A2010, and must be stabilized and separated from other materials, and then dumped at a controlled landfill site.

Organic substances polluted with PCBs are classified as A3180 Y45, and must be incinerated in a cement kiln or other special incinerator. It is not stipulated, however, of what construction the special incinerator should be.

As pointed out above, the treatment and disposal methods as stipulated in the Management Regulation still leave a lot to be desired, and should go through revisions for gradual improvement.

The purpose of List B, specifying non-hazardous wastes, is not clear. Once hazardous wastes are specified in List A, all that remains to be done would be to state that other wastes are not subjected to the Management Regulation. Otherwise, confusion may arise on how to deal with a waste not listed in either List A or List B.

The Regulation on Hazardous Waste Management (Decision No.155/1999/QD-TTg) requires that entities hauling, treating or finally disposing of hazardous wastes be those certified by the Ministry of Science, Technology and Environment (MOSTE). On the other hand, however, neither a treatment facility nor final disposal site for hazardous wastes is currently available, nor the manifest system has yet been realized. A construction site has already been secured for a waste incinerator and hazardous waste disposal site within the premises of the landfill disposal site for municipal wastes operated and managed by the Urban Environmental Company (URENCO) at Nam Son, 50km north from the city center of Hanoi. But there is no prospect of the construction to be started as the Corporation is waiting for financial assistance from abroad.

When no hazardous waste treatment facility is available in the country into which a company moves, the company needs to pay careful attention to how to dispose of waste it generates. Vietnam as it now stands is just like what Malaysia used to be 20 years ago. At that time, a factory affiliated with M Chemical Company in Japan was extracting yttrium, a member of the rare-earth group, from monazite ore exploited in Malaysia, and the extraction process was generating waste containing thorium, a radioactive element. While this waste was piled up in a nearby ground, it caused radioactive damage to residents in the neighborhood, and they sued the company for this damage. It was found, however, that the company was not legally liable, as there was no facility available for treating and disposing of such waste. However, the factory's operations were suspended and the radioactive waste in question was dug out and transported to Japan.

In Vietnam, hazardous wastes can be disposed of through a waste disposal contractor for some fees. However, these wastes seem to be dumped at a landfill disposal site together with general wastes, as mentioned earlier. In order to prevent these wastes from causing any problem in the future, some Japanese companies store hazardous wastes within their own premises. Their storage sites are well

prepared and of the same construction as a controlled landfill site in Japan. They intend to store these wastes that way until the Vietnamese Government provides appropriate systems of legislation and treatment facilities. For large volumes of hazardous wastes or any quantity of highly dangerous wastes, it would be necessary to take similar measures.

Figure 1-6-1 Outline of Hazardous Waste Management¹⁾

Classification		Criteria		Treatment or Disposal Measures													
				Recovery		Physical/Chemical Treatment			Incineration		Landfill						
				Oil/Solvent	Metal	Redox	PH Adjustment	Stabilization	Separation	Cement	Special	Sanitary	Special				
List A: Hazardous Wastes	A1	Metal and metal bearing wastes : 18 types															
		ex. A1020 Y26	Cadmium; cadmium compounds	Cd > 0.1%													
		ex. A1040 Y21	Hexavalent chromium compounds	Cr ⁶⁺ > 1%													
		ex. A1060 Y34	Waste liquors from the pickling of metals	pH < 2													
	A2	Wastes containing principally inorganic constituents, which may contain metals or organic metals : 5types															
		ex. A2010	Glass waste from cathode ray tubes and other activated glasses	All													
		ex. A2050 Y36	Asbestos waste (dust and fibres)														
	A3	Wastes containing principally organic constituents, which may contain metals and inorganic materials : 19types															
		ex. A3010 Y11	Waste from the production or processing of petroleum coke or bitumen	All													
		ex. A3150 Y45	Waste halogenated organic compounds	All													
		ex. A3180 Y45	Wastes, substances and articles containing consisting of or contaminated with PCB, PCT, PCN, PBB or any other polybrominated analogues of these compounds	50mg/kg ²⁾													
	A4	Wastes which may contain either inorganic or organic constituents : 16types															
ex. A4060 Y9		Waste oils/water and hydrocarbons/water mixtures and emulsions															
ex. A4080 Y15		Wastes of an explosive nature															
ex. A4110		Wastes that consist of, contain or are contaminated with any congener of polychlorinated dibenzo-furan or dibenzo-dioxin															
List B: Non-Hazardous Wastes	B1	Metal and metal bearing wastes : 24types															
		ex. B1010 Metal and metal alloy wastes, in non-dispersible form	Iron and steel scrap, copper scrap, Nickel scrap														
	B2	Wastes containing principally inorganic constituents, which may contain metals and organic materials : 12types															
		ex. B2010 Wastes from mining operations, in non-dispersible form	Natural graphite waste, Slate waste														
	B3	Wastes containing principally organic constituents, which may contain metals and inorganic materials : 14types															
		ex. B3010 Solid plastic waste															
B4	Wastes, which may contain either inorganic or organic constituents : 3types																
	ex. B4030 Used single use camera, with batteries not include on list A																

1) Excerpt from Regulation on Hazardous Waste Management (Decision No.155/1999/QD-TTg), List A and List B of Annex 1

2) Wastes, substances and articles containing consisting of or contaminated with PCB, PCT, PCN, PBB or any other polybrominated analogues of these compounds at a concentration level of 50mg/kg or more

Section 7
Environmental Impact Assessment in Vietnam

1. Procedure for Environmental Impact Assessment in Vietnam

In Vietnam, prior to the implementation of a new development or investment project, the entity implementing such project is basically obligated to perform an environmental impact assessment procedure. This procedure is mandatory for the acquisition of an investment license and a building permit for the project, and it is impossible to implement any new investment project without performing this procedure.

Environmental impact assessment is required on the basis of Articles 17 and 18 of the Law on Environmental Protection (LEP); Articles 9 through 20 of Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No.175/CP); and other pieces of legislation.

Article 18 stipulates that entities implementing development projects after the promulgation of LEP (January 10, 1994) must prepare and submit an environmental impact assessment report so that the Vietnamese Government may review the project for its environmental impact.

Article 17 stipulates that entities that started operations prior to the effective date of LEP must also submit an environmental impact assessment report (which may virtually be called a document applying for simplified review of environmental impact) to the relevant environmental administrative body.

Specific procedure for environmental impact assessment is stipulated in Government Decree No.175/CP, which indicates, among other things, the types of business for which environmental impact assessment is required, the review agency, and the items to be included in the environmental impact assessment report.

Government Decree No.175/CP lists, as the projects for which environmental impact assessment is required, "projects being carried out on the territory of Vietnam with the funds invested, assisted, granted or contributed by foreign organizations or individuals or international organizations" along with economic, scientific, social, and other projects, and stipulates that the investor or entity implementing any of these projects must conduct environmental impact assessment.

Government Decree No.175/CP then specifies the scope of environmental impact assessment that includes: (1) the current situation of the environment around the project site, (2) any impact that the implementation of the project may have on the environment, and (3) proposed measures for environmental protection.

In accordance with these provisions, the entity implementing the project must perform the environmental impact assessment procedure. The required procedure includes preparing explanatory material concerning possible effects on environmental factors for attachment to the application form for an investment license; preparing and submitting an environmental impact assessment report to the relevant environmental administrative body after the acquisition of the investment license; and receiving a notice approving the environmental impact assessment report.

In Vietnam, which encourages foreign investment, in order to prevent the above-mentioned strict provisions for environmental impact assessment from hindering effective foreign investment, provisions are also laid down for relaxing the requirements and simplifying the procedure on certain conditions for investment or development projects undertaken by foreign investors. These simplified procedures are based on the Circular Letter of Guidance on Setting Up and Reviewing the Environmental Impact Assessment (EIA) Report for Investment Projects (Circular No.490/1998/TT-BKHCHNMT).

This Circular Letter first divides investment projects into Category , projects having marked environmental impact; and Category , other projects. When a project falls under Category , it then requires the entity implementing the project to prepare a full-fledged environment impact assessment report, while, for Category , it allows the entity to complete the environmental impact assessment procedure only by performing a simplified procedure of submitting the Registration for Securing

Environmental Standards for official review.

A lot of Japanese companies, many of which are in processing or assembly industry, locate their factories in industrial estates or export processing zones. As a result, since these estates or zones usually finished the environmental impact assessment for the whole of the estate or zone when it was originally built, most of the companies may complete the environmental impact assessment procedure in accordance the relaxed provisions.

This Circular Letter was issued in 1998 by revising the Circular on Guiding Preparation and Review of Environmental Impact Assessment Report for Investment Projects (Circular No.1100/TT-MTg) issued in 1997 for the purpose of promoting foreign investment.

2. Environmental Impact Assessment Procedure for Foreign Investment Projects

The Circular Letter of Guidance on Setting Up and Reviewing the Environmental Impact Assessment (EIA) Report for Investment Projects (Circular No.490/1998/TT-BKHCHNMT) requires the preparation of an environmental impact assessment report for official review for "all projects which may likely cause potentially and widely spread environmental impacts and accidents, and others which may cause constraints to the environmental control or may be non-point pollution sources." Its Annex lists 25 types of applicable projects and their applicable sizes.

For a project classified as Category by the Circular Letter, "description of environmental impact factors" must be submitted as one of the documents to be submitted at the stage of applying for an investment license.

It is stipulated that this description material must explain (1) the environmental situation of the project site, (2) production technology processes or flow charts, usage of raw materials and fuels, etc. (3) major factors that may have environmental impact as a result of implementing the project, and (4) an outline of proposed remedy options for negative environmental effects by the project.

At the stage of designing and construction for the project after obtaining the investment license, an environmental impact assessment report must be prepared and submitted to the relevant environmental administrative body for review.

As stipulated in the Appendix to Government Decree on Providing Guidance for the Implementation of the Law on Environmental Protection (Government Decree No.175/CP), the environmental impact assessment report must include (1) an outline of the project, (2) the environmental situation of the project site, (3) a forecast of environmental impact resulting from implementing the project, and (4) a description of alternative projects.

The Decree also stipulates which environmental administrative body shall review environmental impact assessment reports submitted. It stipulates that either the Ministry of Science, Technology and Environment (MOSTE) (the real work is assigned to the National Environment Agency - NEA) or the relevant Department of Science, Technology and Environment reviews the reports according to the size of the project in any of the designated 41 sectors.

The relevant environmental administrative body will review the report and decide to approve the report if there is no problem with it, within two months of its receipt. Upon this approval, the entity implementing the project will apply for a building permit for the project, and may start operations after the building passes inspection by the relevant environmental administrative body.

It should be noted, however, that the Circular Letter of Guidance on Setting Up and Reviewing the Environmental Impact Assessment (EIA) Report for Investment Projects (Circular No.490/1998/TT-BKHCHNMT) carries the provision that if any project under Category is to be implemented in an industrial estate or export processing zone that has completed the environmental impact assessment, the

entity implementing the project may complete the environmental impact assessment through the simplified procedure applied to Category projects as described below. This means that the above-mentioned full-fledged procedure for preparing the environmental impact report is required only if a factory is going to be built on a site developed specifically for that project outside an industrial estates or the like.

For a project under Category , the procedure for environmental impact assessment will end when the Registration for Securing Environmental Standards, a document applying for simplified review of environmental impact, is submitted to the relevant environmental administrative body for review at the same time when the investment license is applied for.

The content of the Registration for Securing Environmental Standards is specified in the Annex to the Circular Letter of Guidance on Setting Up and Reviewing the Environmental Impact Assessment (EIA) Report for Investment Projects (Circular No.490/1998/TT-BKHCMNT). The registration shall cover (1) an explanation of the planned project site, (2) an outline of production technology for the project, (3) an outline of possible sources of pollution for the project, (4) an outline of pollution preventive measures for the project, (5) an environmental monitoring plan for the project, and (6) a letter pledging to meet the environmental standards involved.

Upon receiving the Registration for Securing Environmental Standards, the relevant environmental administrative body will review the form and decide whether or not to issue an Environmental Approval Certificate, within 20 days. As mentioned earlier, in accordance with the Circular No. 490, any investment in an industrial estate or export-processing zone that has completed the environmental impact assessment procedure will automatically be deemed as a project under Category , for which the simplified procedure is applied. As most of Japanese companies locate in an industrial estate or the like, they may complete the environmental impact assessment through the simplified procedure that calls only for the submission of the Registration for Securing Environmental Standards.

Chapter 2

Environmental Conservation

by Japanese Companies in Vietnam

: Case Studies of Corporate Practices and Policies

The Japanese companies in Vietnam studied in this project are implementing steady environmental conservation measures, with particular emphasis on wastewater treatment. Some of these companies have set their own effluent standards stricter than the Vietnamese legal standards and implementing excellent environmental conservation measures, beside statutory measures to meet various legal regulations. The industrial estates of Japanese capitals, where a large number of Japanese companies are established, also promote their own environmental conservation measures. These measures include their own effluent standards on the basis of Japanese experience on industrial pollution, or a termination clause in their tenant contracts enabling the industrial estates to retire the tenant that causes an environmental violation. Thus, the industrial estates of Japanese capitals indirectly contribute to upgrading environmental conservation measures of Vietnam.

Chapter 2 presents 16 practical cases of environmental conservation measures by Japanese companies, mostly in the manufacturing sector, on the bases of the interview and inspection surveys on about 20 Japanese companies in Vietnam. Section 1 of Chapter 2 first outlines environmental conservation measures by Japanese companies and second presents the 16 cases. Sections 2, 3, 4 and 5 present four cases of coping with strict effluent water standards, three cases for establishing the environmental management system, four cases of positively dealing with industrial wastes, and five cases of promoting innovating environmental conservation measures, respectively.

Section 1

Japanese Companies in Vietnam and Their Environmental Conservation

The study team conducted interview and inspection surveys on about 20 Japanese companies operating in Vietnam from November to December 2001. The study team visited the field establishments of these companies, where environmental conservation measures were implemented, and inspected their various measures and manufacturing processes. The Japanese enterprises have begun advancing to Vietnam at a significant pace since around 1994. Most Japanese companies the team visited this time have been operating in Vietnam not more than ten years, and are operating in industrial estates, with a few exceptions. These companies are all in the manufacturing sector except for industrial estate managing companies.

This chapter introduces in the next section and onward 16 practical cases of environmental conservation measures taken by Japanese companies. As are explained in these cases, these Japanese companies are implementing environmental conservation measures, comparable to or even more advanced than those taken in Japan, with wastewater treatment to meet effluent standards stricter than the Japanese standards, as the center of their measures. Many of them are keen in the establishment of environmental management systems. One of Japanese companies was the first in Vietnam to acquire the certification of ISO14001, or the certification by the International Standards for Environmental Management System.

The environmental regulations are generally copies of the U.S. or European standards, and therefore they are generally very strict. By contrast, the environmental policy measures are not very coherent, as may be explained by the fact that Vietnam has yet to have a facility to treat or dispose of hazardous wastes. The Japanese companies, intending at least to implement environmental conservation measures necessary to satisfy legal requirements, found many difficult problems with promoting environmental conservation measures in Vietnam.

1. Firm Environmental Conservation Measures for Various Problems by Companies of Japanese Capitals

The survey team conducted interview and inspection surveys on about 20 manufacturing Japanese companies in the Northern Region around Hanoi, and the Southern Region around Ho Chi Minh City. Besides, the survey team conducted interview and inspection surveys on 4 industrial estate development and managing Japanese companies.

Every company we visited has executed firm environmental conservation measures, with wastewater treatment as one of the core pollution prevention measures. With only some 10 years since the government of Vietnam began taking measures against environmental issues, naturally the Japanese companies face a number of constraints in executing their routine environmental conservation measures. These constraints include insufficient environment-related infrastructure, unprepared environment-related legal systems, and people's unawareness of environmental issues. These issues stem mostly from Vietnam's national socioeconomic system and administrative system; therefore, it is difficult for a Japanese company alone to solve these issues. Besides, it would take long to solve them. Under such circumstances, the Japanese companies are operating under adverse situations as far as environmental conservation measures are concerned.

In Vietnam where economic development has the top priority, environmental conservation measures do not necessarily have a high priority. Naturally, Vietnam's administrative organizations in charge of environmental conservation are not as capable as their counterparts in Southeast Asian countries. Accordingly, effectiveness of the environmental regulations is not necessarily ensured. To make the situation even worse, state-owned companies, while accounting for about half the nation's mining and manufacturing production, execute almost no environmental conservation measures. Some Japanese companies that have advanced to Vietnam in the form of a joint venture with a state-owned company complain that the Vietnamese joint venture partner does not understand the importance of environmental conservation measures even when the Japanese side formulates excellent ones.

Under such circumstances, the Japanese companies that have advanced to Vietnam are obliged to abide by the environmental regulations, irrespective of whether these regulations are reasonable or not, and firmly implement environmental conservation measures, comparable to or even more advanced than, those done in Japan. Actually, some of the companies the survey team visited have already executed excellent environmental conservation measures. These measures include achieving their own effluent standards even stricter than the already strict effluent standards of Vietnam by innovating their environmental measures. For example, they have installed controlled landfill sites for hazardous industrial wastes in their own premises, or made necessary measures for lack of such public treatment and disposal facilities in Vietnam. The Japanese industrial estates all provide excellent facilities for environmental conservation, including wastewater treating facilities, for the tenants to use, thereby playing the role of forerunners in upgrading environmental conservation measures of Vietnam as a whole.

2. Environmental Conservation Measures of Japanese Companies Focusing on Wastewater Treatment

The 20 Japanese companies that accepted the survey team visits this time are mostly such manufacturing industries as machine assembly or part manufacturing; in other words, the type of industry that does not normally pose great environmental loads. Nevertheless, all these companies have executed firm environmental conservation measures based on the principle that the environmental conservation measures constitute a normal corporate activity. This is partly because many of their parent companies are all established firms that could promote similar environmental conservation measures to the extent possible whichever countries they advance, on the basis of their global environmental policies. This is also largely because their Japanese executives have experienced environmental conservation measures in manufacturing plants in Japan. In addition to that, quite a few companies recognized reduction of energy cost and production cost through implementation of environmental conservation measures. The Japanese companies advanced to Vietnam are internationally well known so their brand names are

recognized as product names in Vietnam. For such companies, any environmental damage caused by them could harm reputation of their brand images. This is one of the reasons why these Japanese companies are very keen to take environmental conservation measures.

The Japanese companies in Vietnam have rather concentrated on wastewater treatment. As explained in Section 4 of Chapter 1, the effluent standards of Vietnam are much stricter than the corresponding Japanese national standards. This is true with those for COD, an index of organic contamination, and heavy metals. These companies have installed high-performance wastewater treating facilities to comply with these effluent standards. These facilities require minute routine operation cares. These companies exercised utmost caution in the operation of these facilities and comply with the effluent standards. Some of them have set their own stricter standards to achieve, as well as easily achieving the standards of Vietnam, or made substantial investments in installation of wastewater treating facilities. Others expanded their wastewater treating facilities after they had commissioned their plants when the government of Vietnam established new effluent standards.

In case of a plant in an industrial estate with a central wastewater treatment facility, the central wastewater treatment facility on principle treats BOD, COD and suspended solids to the secondary treatment. Some of the Japanese companies treat these 3 pollutants to the secondary treatments at their own wastewater treating facilities before sending their effluent water to the central wastewater treating facilities of the industrial estates, in consideration of associated environmental risks. The survey team visited plants of the Japanese companies located not in industrial estates. Because these plants discharge treated wastewater directly to rivers, they exercise utmost caution to comply with the effluent standards. There are cases of plants where the plants every day measure such basic water quality indicators as BOD, and discharge to the river is stopped if any abnormality is found.

The Japanese companies we visited implement excellent wastewater treatments. The survey team noticed a number of such contradicting cases as Japanese companies were keenly engaged in the wastewater treatment while nearby state-owned companies discharged foul water without any treatment, or the quality of river water was inferior to that of the water discharged by Japanese companies.

The survey team visited during the field survey the National Environment Agency (NEA) and the Department of Science, Technology and Environment (DOSTE), the latter both in Hanoi and Ho Chi Minh City. The officers in charge of pollution control of these authorities highly evaluated wastewater control measures of the Japanese companies as being particularly good among companies of foreign capitals.

Regarding atmospheric pollution measures, very few Japanese companies we visited this time emit pollutants from their manufacturing processes. Some of them have their own in-house power generators or steam generating boilers to cope with unreliable public electric power infrastructure. These plants exercise their own air pollution prevention measures to these facilities. Regarding sulfur dioxide emission, as explained in Section 5 of Chapter 1, a low-quality fuel oil containing sulfur at 3% is the only commercially available fuel oil in Vietnam. There are cases where plants have to exercise difficult measures to deal with effluent gas. This is one of the problems peculiar to Vietnam, which is lagging behind other Southeast Asian countries in preparation of social infrastructure.

A number of Japanese companies are keen to establish their environmental management systems. One of Japanese companies was the first in Vietnam to acquire certification of ISO14001, the International Standards for Environmental Management System. At the time of the field survey, about 30 establishments in Vietnam had reportedly acquired the ISO14001 certification. Almost all of them were Japanese companies. Not merely just acquiring the certification, the process of acquiring the ISO14001 certification was used to enhance the environmental awareness of the Vietnamese senior members and operators. In such a case, the works for acquiring the certification were delegated to the Vietnamese staff and employees to the extent possible. The Vietnamese senior members participated in conferences of persons responsible for environmental conservation of group companies in Southeast Asian countries,

or even in environment-related conferences in the parent companies' head offices in Japan. Through such arrangements, efforts were made to get the Vietnamese staff and employees to understand environmental considerations of group companies in other countries, and level of the Vietnam's environmental conservation measures and their problems.

There are about 70 industrial estates and export processing zones in Vietnam. The Japanese industrial estates, though constituting only a small fraction of these establishments, exercise excellent environmental conservation measures, thereby contributing to upgrading environmental conservation measures of Vietnam. These Japanese industrial estates naturally have their own environmental facilities such as wastewater treating facilities. A certain industrial estate includes alkyl mercury and PCBs, the substances not included in the Vietnamese standards, in its effluent standards based on Japanese experience on industrial pollution. The industrial estate requires the tenants to abide by the estate's standards including these substances. The company managing this industrial estate considers that preventing the industrial estate from causing environmental problems eventually leads to the protection of the interest of the tenant companies. Inclusion of alkyl mercury and PCBs, the two substance groups that respectively caused the Minamata disease and Kanemi oil poisoning symptoms, in the company's effluent standards stems from this principle. Another Japanese industrial estate provides a termination clause in its tenant contract, in which the estate reserves the right to retire the tenant from the industrial estate in case the tenant causes an environmental violation. The industrial estate managing company first demands the tenant causing an environmental violation to rectify the situation. If the tenant fails to rectify the situation the tenant has to leave the industrial estate. Tenants can advance to this industrial estate on condition that the tenants will abide by this termination clause.

Japanese industrial estates tend to be mainly occupied by Japanese companies. However, there are some non-Japanese foreign companies operating in Japanese industrial estates. It is expected that Vietnamese companies will advance to the Japanese industrial estates. In view of such a trend, the forward-looking environmental considerations by these Japanese industrial estates will greatly contribute to environmental conservation measures of Vietnam, while these measures are indirectly effective on the environment in Vietnam.

3. Treatment and Disposal of Hazardous Industrial Waste, Unavoidable Challenge

As explained in Section 6 of Chapter 1 and in other parts, the issue of industrial wastes, hazardous industrial wastes in particular, will present a serious environmental challenge to Vietnam. The government of Vietnam promulgated the Regulation on Hazardous Waste Management (Decision No.155 /1999/QD-TTg) in 1999, marking the beginning of regulation on hazardous industrial wastes. However, no facility for treating and disposing of hazardous wastes in conformity with this regulation has been built in Vietnam. Although the government plans to build 3 facilities to treat hazardous wastes, one each for the Northern, Central and Southern Region, the government is unable to allocate fund for these facilities, and there will be some time before these facilities are completed. In Vietnam the custom of sorting wastes is not established or the concept of industrial wastes has yet to be well understood. Once consigned to collection service agents, wastes of any kind will be collected; however, these wastes are lumped together and used for land filling regardless of whether the wastes are hazardous ones or municipal wastes. The field survey identified certain Japanese companies worrying about treatment and disposal of hazardous industrial wastes generated at the manufacturing processes for fear of them causing environmental contamination. Since only few of the Japanese companies produce hazardous industrial wastes and, therefore, the issue of industrial wastes has not become a matter of urgency. The issue of hazardous industrial wastes is expected to present unavoidable challenges to Japanese companies operating in Vietnam, as Japanese companies increase in number and become versatile in industrial type.

Malaysia was in a similar situation some 10 to 20 years ago. Malaysia began regulating hazardous industrial wastes in 1989 without having a treating and disposal facility for hazardous wastes. Japanese companies then operating in Malaysia were obliged to store hazardous industrial wastes within their own plant premises in order to abide by the law for about 10 years until 1997, when such a facility began partially operational. Those days, these companies' plant premises were generally filled with drums

containing hazardous industrial wastes being stored.

The Japanese companies in Vietnam are not necessarily expected to experience a situation similar to that occurred in Malaysia. Nevertheless, some Japanese companies cope with hazardous industrial wastes in innovating manners. Certain Japanese companies with chemical treatments or painting processes have begun storing their hazardous industrial wastes in their own plant premises or rented plots of the industrial estates. Certain companies have installed controlled landfill facilities with lining to prevent seepage in their plant premises, to improve safety of storage of the wastes. Further, a company operating a plant with a process that may produce wastewater sludge containing heavy metals made a heavy investment in a treating facility, comparable to commercial intermediate treatment and disposal facilities of Japan, to treat the sludge. The sludge containing copper is enriched in copper content following a primary treatment and is exported to a Japanese copper refining company as a raw material for copper.

4. Required System for Sharing Environmental Information

The Japanese companies now operating in Vietnam, including those exercising innovating environmental measures, are acting on their own in their environmental conservation measures and collection of relevant information, partly because the number of Japanese companies is still small. As is explained previously, the environment-related infrastructure and related legal systems are still in the preparation stage in Vietnam; therefore, Japanese companies are often confronted with difficult problems in pursuit of their environmental conservation activities. Most of these problems are too complicated to be solved by a Japanese company alone, because these problems stem from the socioeconomic structure and the administrative system of Vietnam. Under such circumstances, the Japanese companies should develop an information network as soon as possible whereby these companies can cooperate with each other, collect environmental information more efficiently, share common information, and work together on the government for improvement of undue environmental regulations.

A certain Japanese company filed a request with the government for early installation of a treating facility of hazardous industrial wastes. Such an initiative would be more effective if several Japanese companies with significant presence in Vietnam would jointly do it. The Japanese companies can jointly make appropriate and practical recommendations suited to the conditions of Vietnam to the government when the government attempts to revise environment-related laws and regulations. Similar approaches have already been done in such fields as capital investment, labor problems, other than environmental conservation. An arrangement whereby Japanese companies can cooperate to deal with common problems would be necessary in the issues relating to environmental conservation.

In certain Southeast Asian countries where a large number of Japanese capitals have advanced and have been operating for many years, Japanese companies have established a committee to deal with environmental problems in such organizations as Japan Chamber of Commerce and Industry. Such a committee prepares guidebooks for environmental conservation measures, routinely collects information, thereby playing an important role in provision of environment-related information to Japanese companies. In such countries as Malaysia, activities of such an organization include filing a petition with the government for reduction of the fees for treatment and disposal of hazardous industrial wastes.

If such an organization is established either in the Japan Business Association in Vietnam, or the Japanese Business Association of Ho Chi Minh City, or in both, the organization could do many things. Such an organization could collect environment-related information to be shared by the Japanese companies, form a group of Japanese companies in each industrial estate for promoting exchange of information to facilitate acquisition of the ISO14001 certifications. A major Japanese manufacturer of water treating facilities has established a local company in Vietnam. This local company is providing its clients, or Japanese companies, with various pieces of environment-related information. This constitutes a favorable condition. Cooperation by such a company would be necessary.

As is mentioned previously, the Japanese companies have begun making contributions to human resource

development through such efforts as those to acquire the ISO14001 certification. Very few Vietnamese officials occupy the posts responsible for environmental conservation measures in Japanese companies, because of their short presence in Vietnam. In future, the local staff and employees will be responsible for environmental conservation measures in the Japanese companies as are the case with their counterparts in other Southeast Asian countries. It is therefore necessary to develop professionals in environmental measures on one hand; it is also necessary to enhance awareness for environmental conservation among general employees. This could lead to upgrading of environmental conservation measures in general of Vietnam, including resolution of the problem of residential wastes, if such endeavors are seen in a broader perspective. It will also become necessary in future to transfer the Japanese companies' innovating technologies for environmental measures and knowledge on past pollution controls to administrative organs for environment of Vietnam.

Regrettably, among the companies visited, there are cases where the process of determining and implementing environmental conservation measures from the time of advancing to Vietnam has not been clearly handed down to the present management, staff and employees, although the companies' presence in Vietnam is not very long. In the case of Japanese companies, the management staffs mostly change in a few year intervals. Nevertheless, it is desired that sure systems be established in every company whereby the past environmental conservation measures be transferred to the succeeding persons in charge of environmental conservation, in order to be able to implement excellent environmental conservation measures on a long-term basis.

Section 2

Cases of Meeting Strict Effluent Standards

Sections 2 through 5 summarize the findings in their environmental conservation measures by visiting surveys at the subject companies. The report contains numerical information on such items as amounts of pollutants discharged and their concentrations in the effluent streams to the extents the subject companies disclosed.

When the government of Vietnam determined effluent standards for wastewater, the government received assistance from American and European consultants. Consequently, many of the standards were copied from the strict European and American standards. Some of the standards are extremely stricter, compared with the corresponding Japanese national standards.

To comply with these strict standards, the Japanese companies adopted highly advanced technologies for wastewater treatment, exercised appropriate operation control, or became so innovating that they applied their own standards that were stricter than the official ones and have executed environmental conservation measures according to their own standards.

Case 1 Example of Applying Closed System to Plant Wastewater Treatment

1) Outline of the Company

Company A
 Business line: Manufacture of motored bicycles
 Number of employees: 916
 Start of operation: 1996
 Location of the plant: Vinh Phuc Province about 40km to the northwest of Hanoi
 Japanese equity ratio: 70%

2) Background

Company A (the same as Company H) manufactures motor bicycles. All the operations from press working through painting, aluminum die casting of engines, assembling to inspection are done in this plant. A wastewater containing heavy metals and organic compounds is generated at the painting process. The environmental impact assessment developed at the time of construction planning of this plant adopted Standard A for wastewater. Company A was required to execute first-class environmental conservation measures, because its parent company was one of top manufacturers of motored bicycles in the world. The effluent standards imposed on Company A were very strict ones equivalent to those applied to effluent streams discharged to sources of drinking water. It was found very costly to treat the wastewater from the painting process to a quality level to the standards; therefore, the Company opted to use a closed system, which did not need to discharge the wastewater to outside the plant.

3) Measures Taken by the Company

a. Treatment of Painting Wastewater

The standards for all items of Standard A were applied to this plant. Of these items, the analytical values of 11 items closely associated with the manufacturing process must be reported once in every six months to the Department of Science, Technology and Environment (DOSTE) of Vinh Phuc Province where the plant is located. Figure 2-2-1 compares values of the standards applied to this plant with the corresponding values of Japan's national effluent standards. It may be noted that these standard values are much stricter than their Japanese counterparts. The measuring method of COD is different from that used in Japan as is mentioned previously (see Section 4 of Chapter 1). The effluent standard for COD, in particular, is very strict, corresponding to about 20mg/liter, if this standard is converted into that obtainable by the method used in Japan.

Figure 2-2-1 Effluent Standards for Company A

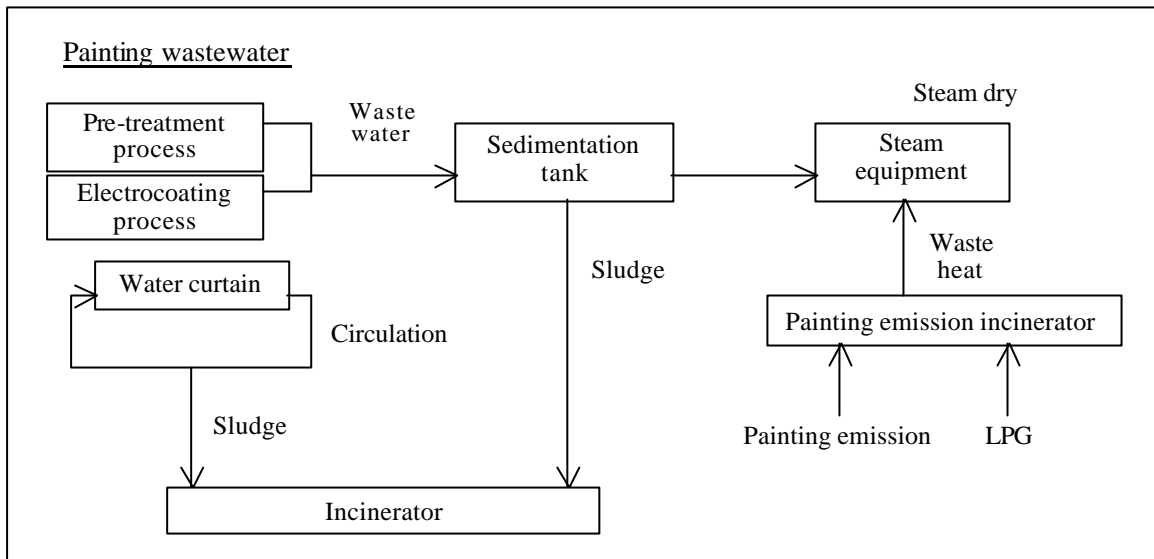
(Unit: mg/liter except for pH and coliform group number in MPN/100ml)

Item	pH	BOD	COD	SS	Oil	T-N	T-P	Pb	Zn	Ni	Coliform
Standard A	6-9	20	50	50	N.D.	30	4	0.1	1	0.2	5000
Japan	5.8-8.6	120	120	150	5	120	16	0.1	5	-	3000

It was necessary to use such expensive treating processes as activated carbon adsorption to treat the painting wastewater, amounting to about 10m³ a day, to this level of COD for sure. Therefore, the plant installed a wastewater treating system, of which the flow is shown in Figure 2-2-2. The wastewaters generated at the pretreatment of steel sheets and electrocoating are subjected to coagulation sedimentation to separate suspended materials. The separated water by the coagulation sedimentation is all vaporized to obtain dry solid residue. The waste heat from burning with LPG of the solvent-containing waste gas from the drying portion of painting process supplies the heat for vaporization. With this wastewater treating system, the plant does not have to discharge the painting wastewater, difficult to treat to the level satisfying the standard, and does not cause water pollution.

The sanitary wastewater and die-cast wastewater, both relatively easy to treat, are biologically treated and discharged to a river flowing nearby, after being stored in a balancing reservoir.

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



b. Environmental Management Program

The plant executes an environmental management program that consists of the following two aspects. One is an environmental education and training program, in which all the departments prepare and execute their programs, and the other is establishment and observance of its own standards for noise, effluent gas and sanitary wastewater. The own standards for the plant specify standard values stricter than the government's standards as may be noted from Figure 2-2-3. By observing the plant's standards, the plant can automatically guarantee conformity to the government's standards. The persons in charge of environment of the Facility Group measure these items; noise once in four months, waste gas once in six months, and wastewater once in every month. If any abnormality is found in the measured data, such is informed to the field operating section in charge, which immediately takes corrective actions. The results of these activities are reported to the management, and reflected in the yearly plan. The person in charge of environmental conservation is a female engineer, a major of environmental science of Hanoi University of Technology. She is also a member of the ISO14001 Committee. This assignment may be interpreted as an indication of the positive attitude of Company A toward human resource development in the field of environmental conservation. It is one of proud management policies of Company A to take environmental conservation measures earlier than they are actually necessary. This could prevent potentially large future expenses and the Company can be proud of its attitudes toward the environment, a feeling of proud difficult to experience elsewhere which further generates other desirable effects.

Figure 2-2-3 Emission Standards Set for Company A's

Noise Standards			
Category	Unit	Vietnam's standards	Company's own standards
Day (6:00 - 18:00)	dB-A	75	70
Night (18:00 - 22:00)		70	65
Midnight (22:00 - 6:00)		50	50
Emission Standards			
Items	Unit	Vietnam's standards	Company's own standards
dusts	mg/m ³	400	200
CO		500	250
SO _x		500	250
NO _x		1000	500
Effluent Standards			
Items	Unit	Vietnam's standards	Company's own standards
pH	-	6 - 9	6.5 - 9
BOD	mg/liter	20	20
COD		50	50
SS		50	45
Coliform	MPN/100ml	5000	5000

Case 2 Example of Treating Difficult-to-treat Concentrated Wastewater in the Plant Premises

1) Outline of the Company

Company B

Business line: Manufacture of printed circuits for personal computers

Number of employees: 2,245

Start of operation: 1996

Location of the plant: An industrial estate in Dong Nai Province 20 km to the east of Ho Chi Minh City

Japanese equity ratio: 100%

2) Background

The process of manufacturing printed circuits produces various wastewaters containing at high concentrations such pollutants as copper, organic substances, oxidizing agents. These wastewaters are so difficult and expensive to treat by each plant that in Japan treatment of these wastewaters is normally consigned to intermediate treating companies of industrial wastes. The intermediate treating company collects similar wastewaters from a number of companies and treats them on a large scale. In the absence of such a specialized treating company equipped with necessary technologies in Vietnam, Company B could not consign treatment of the wastewaters to local collecting and treating agents, which the Company could not trust for not causing environmental problems from the hazardous wastes. Company B opted to install a treating facility similar to those owned by Japanese waste intermediate treating companies.

3) Measures Taken by the Company

a. Origin and Treatment of Wastewater

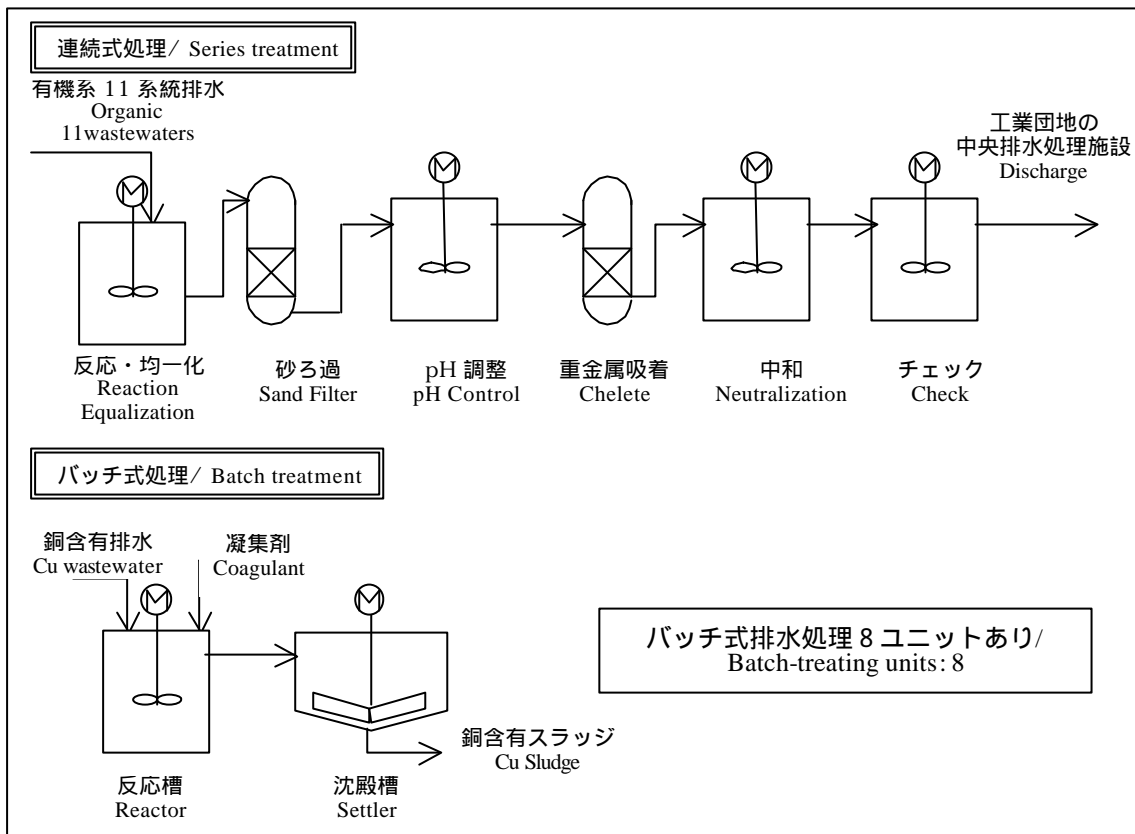
The plant generates more than 10 types of wastewaters. These include a wastewater containing easily degradable organic compounds, one containing copper, one containing very slowly degradable organic compounds, one containing oxidizing agents which make other wastewaters difficult to treat if mixed, and one containing hydrofluoric acid. The combined volume of these wastewaters is 5,000m³/day. Figure 2-2-4 outlines treatment of these wastewaters.

The basic principle of wastewater treatment is that the similar wastewaters are mixed and treated, but wastewaters of different qualities are treated separately in a manner suited to each of them. This plant lumps 11 relatively easy-to-treat wastewaters containing organic substances into one stream and continuously treats it. Specifically, cyanides and others are first decomposed and the wastewaters are equalized, and subsequently subjected to sand filtering and heavy metal adsorption. The wastewater is sent to the central wastewater treatment facility after neutralization. This treating facility does not have the process to decompose organic substances; however, organic substances contained in the wastewater in this line are easily degradable and hence are satisfactorily treated by the biological treatment of the central wastewater treatment facility of the industrial estate.

Other 8 types of wastewaters containing difficult-to-decompose pollutants are separately treated in 8 separately installed batch-treating units. Copper contained in the copper-containing wastewater is precipitated and recovered, and sold to a Japanese non-ferrous metal refining company as a raw material for copper. This sediment contains copper at nearly 50%; therefore, this sediment can be exported to Japan as a resource. Japanese plants of this business line conduct this copper recovery operation only.

The plant operates a unit for decomposing slowly degradable organic compounds by oxidizing agents, a unit to reduce oxidizing agents by reducing agents, a unit to sediment and separate fluorine in the form of a fluorine compound, and other units to separately treat other pollutants, all in batch treatments. Having so many treating units requires a large capital investment. The operation cost is also very high, because the chemicals used for wastewater treatment are all imported. The company took such measures on the principle that the company would take positive environmental measures. The wastewaters after such batch treatments are discharged directly to a river flowing nearby.

Figure 2-2-4 Wastewater Treatment System



b. Waste Treatment

In Vietnam there is no facility to treat and dispose of the sludge generated from wastewater treatment. The wastewater sludge contains hazardous heavy metals. It was the Company's judgment not to consign the wastewater sludge to collecting agents who would receive the sludge at some charge, then just dump it. Therefore, Company B has asked the company managing the industrial estate to store the wastewater sludge in its warehouses. The stock has already reached 1,000 tons. It is not possible to have the wastewater sludge stored indefinitely; therefore, the company filed a petition with the Ministry of Science, Technology and Environment (MOSTE) for appropriate measures. MOSTE has not taken any effective measure so far.

Company B sells such recyclable materials as plastic boards, cardboards, waste paper, scrap iron, solder debris to undertakers. The Company consigns its garbage to a waste treating company at some cost.

c. Gas Emission

The plant has an in-house diesel-driven power generation facility to fill the plant's need for electric power. The plant has difficulty meeting the government's standard for NO_x , $1,000\text{mg}/\text{m}^3$ maximum. When the plant was planned in 1993, there was no standard for NO_x . In 1995, the Industrial Emission Standards-Inorganic Substances and Dusts (TCVN 5939-1995) were enforced. The plant could have installed a low- NO_x diesel-powered power generation facility, if the plant had known such a regulation beforehand. The plant cannot change the power generation facility while the plant is in operation now, and has difficulty with the air pollution prevention measure.

d. Others

Company B has promoted planting mangrove trees as social activity. The Company has so far planted 0.5 million trees.

Case 3 Example of Plant Conformed to Strict Wastewater Effluent Standards Promulgated after Plant Startup

1) Outline of the Company

Company C
 Business line: Manufacture of sewing machine needles
 Number of employees: 350
 Start of operation: 1995
 Location of the plant: An industrial estate to the south of Ho Chi Minh City
 Japanese equity ratio: 100%

2) Background

The metal plating, an essential ingredient of sewing machine needle manufacturing, produces a wastewater containing heavy metals and an alkali wastewater and others. When the plant was being planned before 1994, there were no effluent standards for wastewaters in Vietnam. Accordingly, the company was at a loss as to the type of wastewater treatment facility to be installed. Company C therefore designed and installed a wastewater treatment facility that could conform to the Japanese national effluent standards. In 1995 when the plant had been already placed in operation, the government enforced the Industrial Wastewater-Discharge Standards (TCVN 5945-1995). These standards included items that were not specified in the Japanese standards. Further, much stricter values were specified for the items that were also specified in the Japanese standards. Under such circumstances, the Company was obliged to strengthen the wastewater treatment facility to conform to these strict values of the government's standards, just a short time after the plant was commissioned.

3) Measures Taken by the Company

a. Wastewater Treatment

The plating process generates about 40m³/day of wastewater. The industrial estate where the plant was situated is close to a river mouth. Legally, the plant is supposed to conform to the values specified in the government's Standard C. However, the plant is required to conform to the stricter B level standards by autonomous control of the industrial estate. The plant was not required to report results of effluent water quality analysis to the administrative office of the industrial estate. Nevertheless, the Company has its effluent water periodically analyzed by an analysis company for 6 items relevant to the plant's effluent water; namely, pH, SS, COD, NH₄-N (ammonia nitrogen), fluorine (F) and nickel (Ni). Figure 2-2-5 compares the Japanese national standards used as the design base in the planning stage with Standard B and Standard C of the government of Vietnam.

Figure 2-2-5 Wastewater Effluent Standards Set on Company C

(Unit: mg/liter except for pH)

Item	pH	SS	COD	NH ₄ -N	F	Ni
Standard C	5 - 9	200	400	10	5	2
Standard B	5.5 - 9	100	100	1	2	1
Japan	5.8 - 8.6	200	160	- (T-N 120)	15	-

Of these items of standards, fluorine (F) and nickel (Ni) contained in the wastewater produced at the plating process posed difficulties. The standard for fluorine of the Japan's national standards was 15mg/liter (amended to 8mg/liter in August 2001). In Vietnam, even the more lenient C level standards specify a strict value of 5mg/liter. Nickel, in addition to being not controlled in the Japanese national standards, it is no easy matter to conform to the standard of 2mg/liter. Company C therefore modified the already installed wastewater treatment facility to expand the treating capacity. Before, the concentrated wastewater from the plating process and the diluted wastewater from product washing were received in the same tank and continuously treated. This practice was terminated. After the modification, the concentrated wastewater was segregated, stored and treated separately. With this modification Company C now conforms to the specified values of the Standard B.

b. Wastes

The wastewater sludge is the largest and amounts to about 2 tons/month. The wastewater sludge is filled in drums and consigned to a dealer for disposal. Spent cutting oil and iron scraps are sold to dealers.

Case 4 Example of a Plant in an Industrial Estate Installing its Own Advanced Wastewater Treatment Facility

1) Outline of the Company

Company D
 Business line: Manufacture of cell phone cases
 Number of employees: 63
 Start of operation: 2001
 Location of the plant: An industrial estate in Hanoi (about 15 km to the north of the city center)
 Japanese equity ratio: 100%

2) Background

Company D advanced to Vietnam after its major client had advanced to Vietnam. In order not to bother the client with environmental problems, the Company decided to take thoroughgoing measures for environmental conservation. During the planning stage, the Company learned that Standard B, stricter than the Japan's national standards, would be applied. Since the industrial estate had a central wastewater treatment facility, BOD and COD were supposed to be treated by this facility. The Company could have adopted more lenient standards for BOD and COD; nevertheless, the Company decided to install a facility that could satisfy all items of Standard B as a safeguard against any contingency. The Japanese parent company was fully experienced in the field of surface treatment that required highly advanced wastewater treatment, and also had an excellent record in wastewater treatment. The Company availed itself of the advanced technologies of the parent company in the installation of its wastewater treatment facility.

3) Measures Taken by the Company

a. Wastewater Treatment

Company D gives surface preparation and paints magnesium alloy cell phone cases manufactured by the client's plant. The painted cases are sent to Japan to be fitted with electric parts to become finished products. The surface preparation consists of degreasing, acid washing, and formation of a chemical conversion coating. Therefore, this process produces an alkali wastewater, acid wastewater, wastewater containing phosphorus and one containing hexavalent chromium (Cr^{6+}). The painting process produces a wastewater containing organic compounds.

At first, the administrative office of the industrial estate managing company demanded Company D to analyze and conform to all the 33 items of the B level standards. However, the Department of Science, Technology and Environment (DOSTE) of Hanoi, to which the analytical results are reported, said that Company D had only to control the wastewater on the 11 items shown on Figure 2-2-6. The items for which an industrial establishment should control its wastewater vary depending upon the type of industry.

Figure 2-2-6 Wastewater Effluent Standards Set on Company D

(Units: mg/liter except for pH and coliform group number in MPN/100ml)

Item	pH	COD	BOD	SS	Oil	Cr^{3+}	Cr^{6+}	T-P	F	T-N	Coliform
Standards	5.5 - 9.0	100	50	100	1.0	1.0	0.1	6	2.0	60	5000

The COD value of the standards, 100mg/liter, corresponds to 30 to 40mg/liter if the Japanese measurement method is used, as is mentioned previously (refer to Section 4 of Chapter 1), and is much stricter than the Japanese national standard, or 160mg/liter. Also, the value for hexavalent chromium, 0.1mg/liter, is by far the stricter, compared to the Japanese national standard value of 0.5mg/liter.

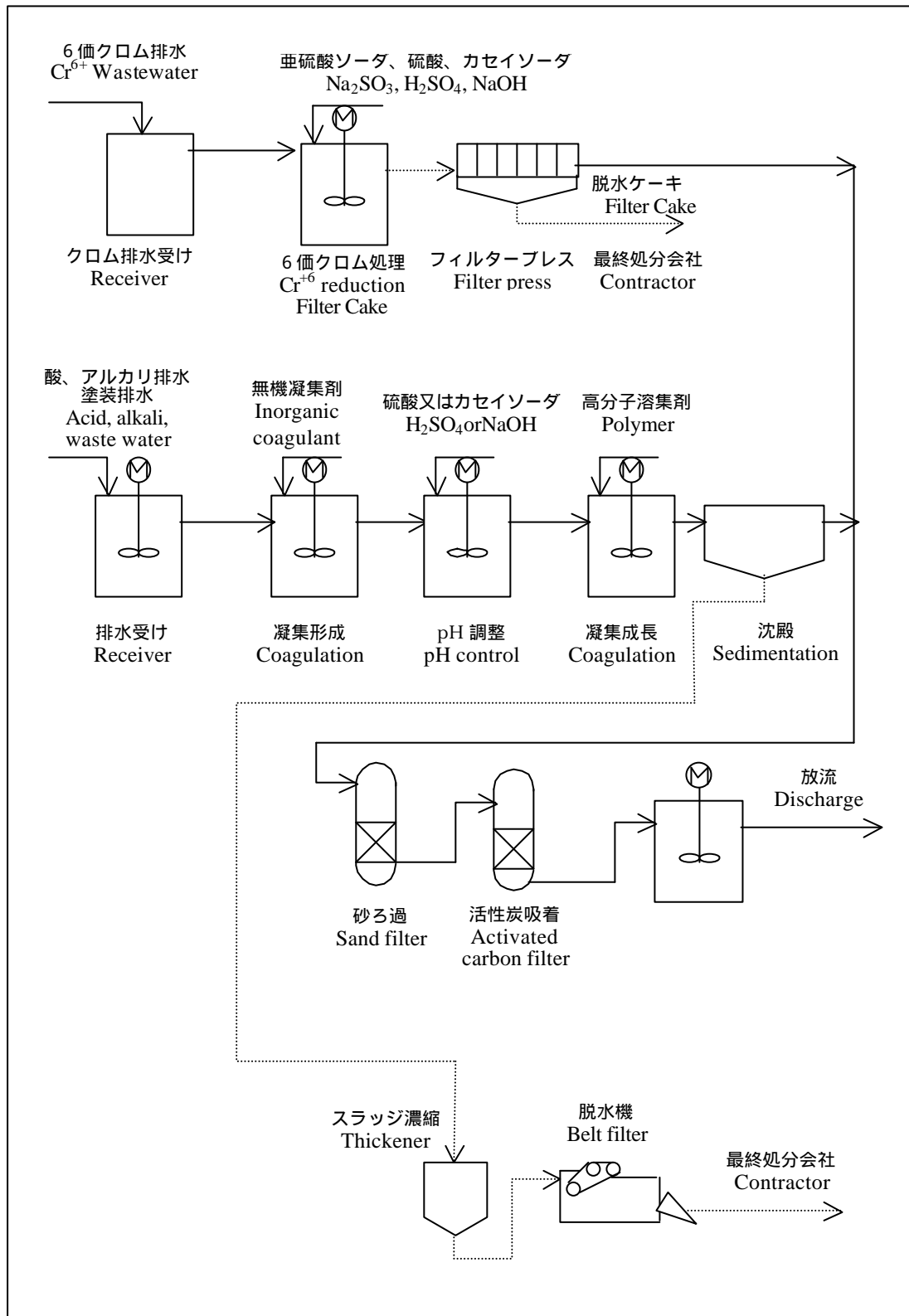
In order to conform to all these standards, the company installed a wastewater treatment facility as shown in Figure 2-2-7. The wastewater treatment facility reduces hexavalent chromium to trivalent chromium. The acid, alkali and painting wastewaters are subjected to neutralization followed by sedimentation by

coagulation. The two trains of wastewater streams thus treated are rid of fine suspended materials by sand filtration, followed by adsorption by activated carbon to remove COD that has passed the sedimentation by coagulation. The wastewater treatment facility conforms to the strict standard of COD through such a process. The capacity of the facility is 4.3tons/day but the actual throughput is smaller, because the plant has become operational just recently, and the plant uses only part of its capacity. The treated water is analyzed by a certified company every month, and the results of the analysis are reported to the administrative office of the industrial estate managing company. The results are also reported to the Department of Science, Technology and Environment (DOSTE) of Hanoi as requested. A Japanese group company designed this wastewater treatment facility and a Thai company of Japanese capitals for wastewater treatment facility constructed it. The wastewater treatment facility cost 7 to 8% of the total plant cost.

b. Waste Treatment

Cardboards, wood frames, empty paint cans are sold to agents who come to buy these things. The Hanoi Urban Environmental Company (URENCO) comes to collect the wastewater sludge and garbage twice a month, 2tons/each and at a cost of 3,200yen/ton. The collected wastes are simply land filled. URENCO declined to receive the paint debris that deposited in a pit of the painting line from the beginning. The Company found another waste treating company, which now receives the paint debris.

Figure 2-2-7 Wastewater treatment facility of Company D



Section 3

Cases of Establishing an Environmental Management System

The principle of giving priority to and the methods for environmental conservation developed in Japan should be transferred and established in the plants in Vietnam where awareness of the importance of environmental conservation is not high enough yet. It is simply impossible for a few Japanese management staffs to cover everything for environmental conservation matters. Therefore, much of the work on environmental conservation must be delegated to the Vietnamese executive members. To cope with the situation, a number of Japanese companies are keenly enhancing the awareness of Vietnamese executives of the importance of environmental conservation.

There are cases where Japanese companies try to enhance the awareness of Vietnamese executives through education and training courses held in Japan or nearby Asian countries in such movements as planning and promotion for acquisition of the ISO14001 certification, or intra-company enlightening activities.

Case 5 Example of Acquisition of the ISO14001 Certification First in Vietnam

1) Outline of the Company

Company E
Business line: Manufacture of automobiles
Number of employees: 402
Start of operation: 1995
Location of the plant: Vinh Phuc Province 30 km to the northwest of Hanoi
Japanese equity ratio: 70%

2) Background

Company E's parent company is a world-famous automobile manufacturer. The government of Vietnam showed a keen interest when the Company planned to advance to Vietnam. The government strongly requested the parent company to advance to the Northern region, which was lagging behind the Southern region in industrial development. Company E was required to take environmental conservation measures equivalent to those taken by the parent company in Japan, based on the principle of the parent company for environmental conservation.

With such a background in mind, Company E considered it imperative from the beginning not to cause any environmental problem, and therefore the Company planned to acquire the ISO14001 certification, a step effective in promoting a comprehensive environmental conservation measure, from the very initial stage of the plant construction.

The manufacturing process consists of all steps from pretreatment and painting of outer plates to assembling except for press works. The plant produces such wastes as plant wastewater, wastewater sludge, and paint debris. The Company formulated its ISO14001 environmental plan with countermeasures for these wastes.

3) Measures Taken by the Company

a. Acquisition of the ISO14001 Certification

Since around 1997 when the operation became stabilized, the special team for the ISO14001 was established in the Maintenance Department to prepare for acquisition of the ISO14001 certification. In April 1999, Company E became the first company to acquire the ISO14001 certification in Vietnam. In 2001 the Company start working for renewal of the certification with environmental conservation measures and energy saving as main themes. In fiscal 2001 the Company started a project to collect spent engine oils through the car dealers and to recycle it to grease. The Company also promotes environmental education to the employees.

b. Wastewater Treatment

The wastewaters may be broadly broken down into an acid and alkali wastewaters from the pretreatment of steel sheets, a wastewater containing organic substances from the painting booth, and a general wastewater and a sanitary wastewater. These wastewaters are treated by a wastewater treatment facility, of which the flow is shown in Figure 2-3-1. The acid and alkali wastewaters are neutralized at sources and are received in a wastewater pit. The combined acid and alkali wastewaters are mixed with the painting wastewater in the painting wastewater pit. To the mixed wastewater stream is added an inorganic and polymer coagulant to sediment suspended matter, which is separated by precipitation in a form of floc in the primary sedimentation tank. The supernatant clean water is biologically treated in the aeration tank to decompose BOD and COD components. The general wastewater and the sanitary wastewater are directly fed to this aeration tank. The treated water is sent to the final settling tank to separate flocs of microorganisms by settling. The supernatant clean water is temporarily held in a storage tank and is discharged, after its pH value is confirmed, to a river flowing nearby through a sewer. The sludge from the primary sedimentation tank and final settling tank is condensed in the thickener, followed by dehydration by filter press. The dehydrated sludge is filled in drums and stored in the plant premises, because there is no designated disposal facility in Vietnam. The capacity of the wastewater

treatment facility is 600m³/day, but the actual throughput is 150m³/day.

The effluent water from this plant is required to satisfy all items of the Standard B, which are normally applied to water streams discharged to waters used for agriculture. The plant was required to report results of effluent water four times a year at first. In view of the good past performance, now the authority allows the plant to report only once a year, omitting values for the items which have been very low every time. It costs as much as 2,000 U.S. dollars to have a sample analyzed by an authorized analysis company for all 33 items of the Standard B. Reduction of the reporting frequency and items represent a significant saving of cost.

The staff of analysis companies comes to the plant to take samples and analyzes them. The samples are taken at the outlet of the wastewater treatment facility and at the point where the treated water leaves the plant premises. The results of analysis are reported to the Department of Science, Technology and Environment (DOSTE) of Vinh Phuc Province. For control of the wastewater treatment facility, the effluent water is analyzed every day for such basic items as BOD, COD, pH and SS at the plant laboratory. If any abnormality is found with the quality of treated water, discharge of the effluent water is suspended and necessary corrective actions are taken.

A Japanese water treating company constructed the wastewater treatment facility. The acids and alkalis are procurable in Vietnam, but the polymer coagulant is imported.

c. Wastes

The plant generates such wastes as wood frame, wastewater sludge, and paint debris. A dealer takes out the wood frames, the largest in volume of all wastes. The wastewater sludge and paint debris, which contains heavy metals, are filled in drums and voluntarily stored in the plant premises, in the absence of a disposal site authorized by the government. With the increase in the automobile production, the sludge stored in the plant premises increases at an increasing rate. The stored sludge amounted to 100 tons as of the autumn of 2001, after 5 years operation from 1997. Company E is negotiating with a cement company of Japanese capitals for incineration of the wastewater sludge. The Company has also asked DOSTE of the province for early establishment of an authorized disposal site.

d. Social Contribution

At the five-year anniversary of the plant in 2000, Company E started a biogas project with a fund donated by the Japanese parent company's foundation. The plant intends to convert agricultural wastes from nearby farm households into methane to contribute to energy supply. The Company has consigned a university with experiments and R&D.

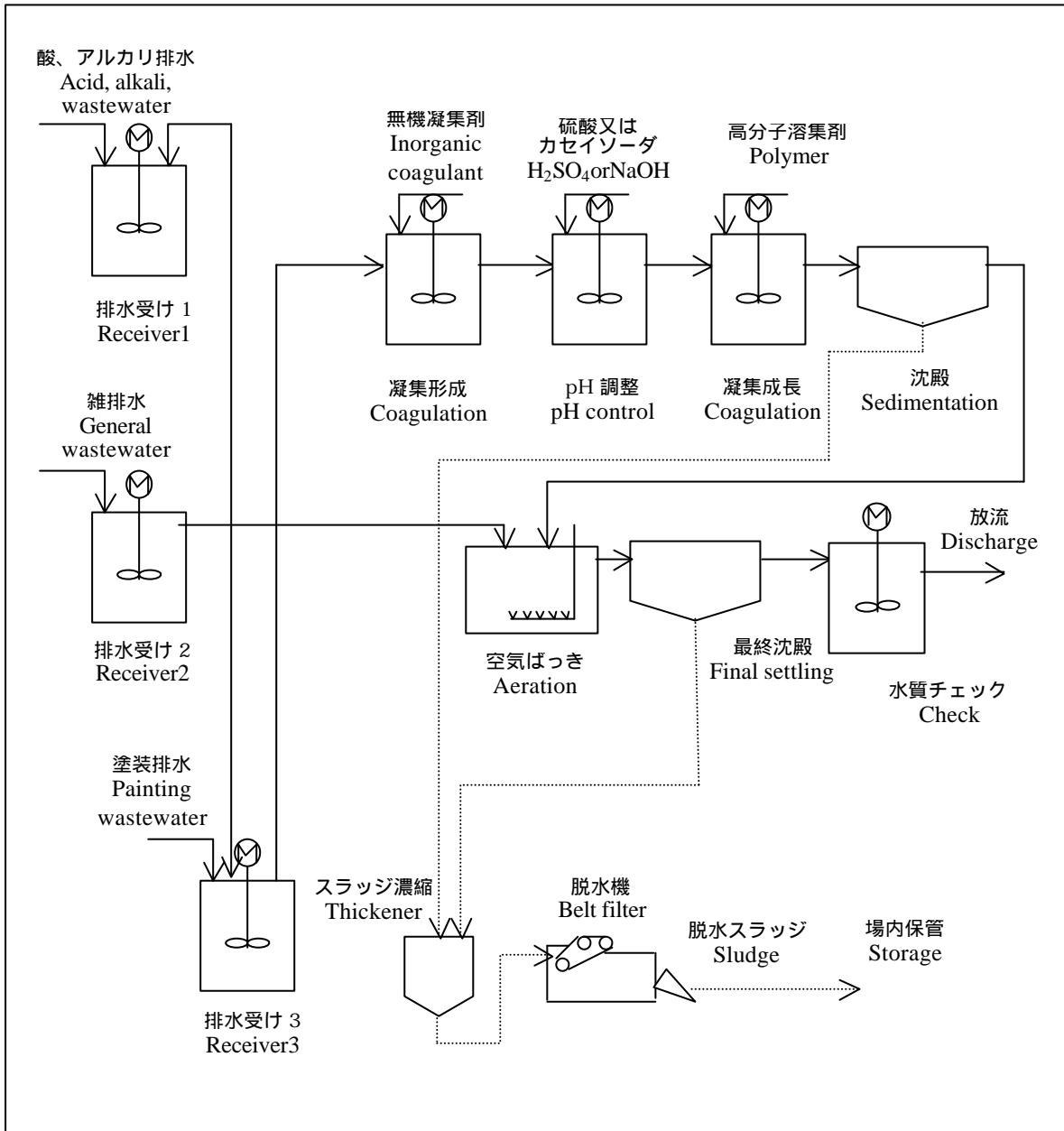
To develop experts of environmental conservation among the central and local government officers, Company E held seminars on environment under the auspices of the above-mentioned foundation. 50 persons participated in the first seminar held in 2001.

e. Others

The emission gas is controlled by the ground level concentrations of pollutants. The stack height is determined by the sulfur concentration of the fuel. The plant uses a diesel fuel containing sulfur at 1%, and the stack height is determined to be 20m. This method of regulation will be reportedly revised.

The plant consults with DOSTE of the province on anything unclear about laws and regulations on environment.

Figure 2-3-1 Flow of Company E's Wastewater treatment facility



Case 6 Example of Enhancing Awareness of the Executive of the Joint-venture Partner

1) Outline of the Company

Company F
 Business line: Manufacture of switch board
 Number of employees: 95
 Start of operation: 1999
 Location of the plant: In Hanoi (20 km to the southwest of the city center)
 Japanese equity ratio: 51%

2) Background

The Japanese parent company of Company F is a world-famous electronic equipment manufacturer. The Japanese parent company demands thorough environmental conservation on its overseas affiliates. The Company plans to acquire the ISO14001 certification in 2003, two years afterward. However, the chairperson and the vice-chairperson of the 49% joint venture partner company are not much keen about environmental conservation. It was therefore found necessary to enhance awareness of and interest in the environmental conservation of the executive members of the partner company.

3) Measures Taken by the Company

a. Various Events on Environmental Conservation

Company F has their employees participate in activities for international cooperation in environmental conservation promoted by the Japanese parent company. The Company explains the purposes of such activities to the executives of the joint venture partner, and the employees who have participated in such activities explain the merits of these activities to the executives. In 2000, the Company sent its employees to a symposium held in Bangkok, Thailand, for group companies in Asia for environmental conservation measures, and let them present Company F's environmental report. In 2001, the Company had its two employees participate in a reforestation campaign for Vietnam, with two parent company members who came to participate in the campaign. Company F bore the expenses for participation in these two events. The Company endeavored to deepen their understanding in environment by explaining the merits of letting the employees participate in these activities to the joint venture executives and to the Administration and Personnel Departments. Since the executives of the joint venture partner have finally admitted the merits of such activities for enhancing environmental awareness, their understanding of the importance of environmental conservation may be regarded as deepened to some extent. The Company is now in the process of establishing an organization in charge of environmental conservation, while negotiating with the Administrative and Personnel Departments.

Some of the environment reports presented at the symposium held in Bangkok were excellent. The report from Company F was a simple one, because it was Company F's first report, and because Company F is engaged only in assembling and therefore does not discharge wastes. The report concerned introduction of the plant, the source of industrial water, the warehouse for storing industrial wastes, and energy saving which consisted in turning the switches off when the electricity was not used. The Company intends to prepare a more solid report for the next symposium, dealing with its activities in energy saving and resource recycling.

The Japanese parent company requires its overseas affiliates' plants to submit its environment report every month. The report should contain data on several tens of items including quality and quantity of wastewater discharged, kinds of wastes and amounts generated, social contribution, electric power consumption. These data are analyzed and summarized in the environment report of the parent company.

b. Others

The plant uses well water. The well water contains iron and manganese at high contents and therefore not suited as industrial water as directly pumped. The water is filtered to remove these elements.

The solid wastes include cartons used as container, plastic sheets for cushioning, removed adhesive tapes. These are sold to dealers except for the tape. The garbage from the canteen is collected by people nearby as animal feed. The wastewater from the dining room is discharged without treatment, and the sanitary wastewater from the toilet is discharged after being treated in a septic tank, to a river.

As a social contribution, Company F makes a donation to the youth RIM activity promoted by young communist party members. This is a volunteering activity in which young people in their late twenties distribute school supplies to schoolchildren in local villages.

Case 7 Example of Transferring Environmental Management to Vietnamese Executives through Acquisition of ISO14001 Certification

1) Outline of the Company

Company G
 Business line: Manufacture and sale of color TV sets and audio products
 Number of employee: 237
 Start of operation: 1996
 Location of the plant: In Ho Chi Minh City (10km to the east of the city center)
 Japanese equity ratio: 60%

2) Background

The Japanese parent company of Company G deploys its group companies throughout the world. The parent company leads its affiliates in their environmental conservation works as one of head office functions. The parent company established a division exclusively in charge of environmental conservation in the Asia Oceania area general managing company; the Company holds once a year a conference of officers in all overseas affiliates in charge of environmental conservation; the Company collects information on environment throughout the world. These are some of the examples the initiatives taken by the parent company. The parent company requires all its group companies to acquire the ISO14001 certification as vindication of their sincere efforts for environmental conservation. Company G is behind most of the group companies in the Asia Oceania group companies. Accordingly, Company G had to prepare urgently for acquisition of the ISO14001 certification.

In addition, it was necessary to awaken the Vietnamese executives, with insufficient recognition of the environment, to the importance of environmental conservation. It was just impossible for only a few Japanese executives to manage everything; therefore, the works of environmental conservation must be delegated to the Vietnamese executives. The measures for environmental conservation being done by the Japanese side must be duly transferred to and established in the Vietnamese executives. Company G therefore has decided to educate the Vietnamese executives for environmental conservation through the activities for acquiring the ISO certification.

3) Measures Taken by the Company

a. Awakening of Vietnamese Executives to Environmental Conservation

Company G was instructed by the Japanese parent company to acquire the ISO certification by the end of 2000. In May 2000, the Company invited experts from the training center in Singapore for the group companies to explain the ISO14001 certification. The Vietnamese executives did not fully understand the ISO14001 certification at that occasion. Given that, the Company decided to start from the basic education and enlightening activities, and put off the target date for ISO14001 acquisition by one year to the end of 2001.

Last year, Company G let for the first time the Vietnamese executives participate in the Asia Oceania Environment Committee, in which group companies from nine Southeast Asian countries participate, and in a conference for persons responsible for environmental conservation held by the Environmental Management Committee by Country. The participants from the Southeast Asian countries presented their accomplishments in environmental conservation one after another. The Vietnamese executive, the participant from Vietnam, explained that the government of Vietnam did not understand the importance of environmental conservation well, and that the Company's measures were not enough either. The Vietnamese executive also participated in a seminar held in Japan and learned from local staff members of group companies throughout the world the environmental measures at their plants. These two conferences impressed the Vietnamese executive very much and convinced the executive that Company G was far behind other group companies in environmental measures. After returning to Vietnam, the executive explained the difference between Company G and the rest of the group companies, and positively promoted acquisition of the ISO14001 certification.

b. Project for Acquisition of ISO14001 Certification

The preparation for acquisition of the ISO14001 certification started in January 2001. The preparation started by appointing a person in the Technical Section to be in charge of ISO14001. The appointed person promoted understanding of the environment management system (EMS) to the concerned persons in the plant. In starting the project, the operation of the plant was suspended for one day and a Vietnamese executive explained to all employees the purpose, content, objective of EMS. Figure 2-3-2 shows the action plan for acquisition of the ISO14001 certification from April.

At first, the environmental policy, consisting of the following five items, was established.

- (1) Observance of environment-related laws,
- (2) Saving of energy, water and paper to protect nature and environment,
- (3) Reduction of solid and liquid wastes and emission gas to reduce environmental loads,
- (4) Promotion of education and dialogues with the employees and suppliers to enhance environmental awareness, and
- (5) Periodical reviews and revisions of objectives and targets

Subsequently, the environmental aspects to be promoted in EMS were reviewed, and items and targets for these items were established. The plant is engaged mainly in assembling works; therefore, the plant does not produce industrial wastewater, hazardous wastes, or combustion waste gas that place heavy burdens on the environment. Therefore, the plant decided the environmental objectives mainly on energy saving and resource saving, to which were added reduction of fume of lead from the soldering process and noise level. The numerical targets for 2001 were as follows.

Resource saving and electric power saving:	Manufacture of TV sets at energy consumption of 3.4 kW/unit
Saving of office paper:	3% reduction from the level of 2000
Load on the atmospheric environment:	Reduction of lead in the effluent air to a maximum of 0.005mg/m ³
Noise:	Punching room to a maximum of 85dB and the surroundings to a maximum of 60dB

In order to realize these numerical targets, the person in charge collected data at each workplace and analyzed them, with the following results.

- Plastic bags that are discarded can be used as packing for cabinet. This enables the plant to stop buying packing, which results in a saving of 3,900 U.S. dollars a year.
- Reuse of electric wire saves 3,740 U.S. dollars a year.
- Recycling of punching materials for speakers saves 19,088 U.S. dollars a year.

Resource savings in other several items will increase the total saving to 35,000 U.S. dollars a year. The plant will keep on saving electric power as a priority theme. Regarding the lead fume, the plant will switch to lead-free solder in 2002, one year ahead of the parent company's schedule. After the switch, there will be no lead fume. The effect of resource saving is already partly evident. The plant summarized the process of achieving the saving and filed with a UK certification body a request for certification of the ISO14001. Company G acquired the certification on October 26, 2001, 9 months after the project started, through the pre-assessment and the primary assessment.

The Vietnamese executives have become aware of the importance of the environment, and operators now pay more attention to the environment than ever. This is a great achievement of these activities.

Figure 2-3-2 Action Plan for ISO14001

Items	Year 2001						
	April	May	June	July	August	Sept.	Oct.
EMS awareness	_____						
Internal audit training	_____						
Establishment operation procedure for EMS	_____						
Identification of environmental aspects, significant impact and improvement program	_____						
To collect basic data for objectives such as electric, water, paper	_____						
Setting objectives and targets	_____						
Implement operation procedure for EMS	_____						
The first Internal audit	_____						
Pre-assessment finding of certifying organization	_____						
Checking EMS by AMS	_____						
Initial assessment by certifying organization	_____						
Certification	_____						

EMS: Environmental Management System
 AMS: Asia Matsushita Management System

c. Waste

The plant produces such wastes as wood pallets containing parts, cartons, fuse debris, and defective products. These are all sold to dealers. The solder debris consists of lead oxides and solder. The plant separates the solder debris into solder and lead oxides by its own method, and consigns treatment of lead oxides only to a dealer. The plant will begin using lead-free solder in 2002; however, Company G is worried about the high cost of lead-free solder. After being sold in the Vietnamese market, use of lead-free solder does not make much sense if the products produced with lead-free solder are repaired with lead-containing solder. The Company is concerned about such possibility.

d. Others

Company G is planting trees in and around the plant premises.

Section 4

Cases of Taking Positive Measures against Industrial Wastes

The government of Vietnam has not yet established facilities to treat and dispose highly polluted wastewater or sludge containing heavy metals. Serious pollution problems have emerged in many other countries several years after disposal from wastes unduly disposed of. The Japanese companies, therefore, exercise utmost caution in the disposal of industrial wastes.

The Japanese companies convert wastes, which would normally be disposed of as waste, into usable products at some cost, or keep on storing all the wastes that may contain hazardous substances in their plant premises, or thoroughly utilize waste. These measures by the Japanese companies are highly appraised in Vietnam.

Case 8 Example of Storing All Industrial Wastes in the Plant Premises

1) Outline of the company

Company H
Business line: Manufacture of motored bicycles
Number of employees: 916
Start of operation: 1996
Location of the plant: Vinh Phuc Province about 40 km to the northwest of Hanoi
Japanese equity ratio: 70%

2) Background

Company H (the same as Company A) manufactures motor bicycles. All the operations from press working through painting, aluminum die casting of engines, assembling to inspection are done in this plant. These processes produce such industrial wastes as wastewater sludge, paint debris, and incineration ash, those that contain heavy metals. In Vietnam there is neither laws regulating such wastes nor facility to treat or to dispose of those wastes. There are dealers who take out these wastes at some cost, but it is not clear how these dealers treat or dispose of these wastes. Company H has declared its fundamental environmental policy, of which the basic policy says the company does not use or discharge to the environment anything harmful. The Company is now doing its best to abide by the fundamental policy. On this principle, the Company would not allow pollution problems to be caused, even in the remote future, by anything that is discharged from the plant.

3) Measures Taken by the Company

a. Type of Wastes and Their Treatment

Figure 2-4-1 shows the types of wastes and treatments the plant gives to them. The wastes are broadly broken down into valuable wastes and non-valuable wastes, and these are further divided into general wastes and hazardous wastes. The general wastes of non-valuable wastes include garbage and documents that are combustible. The hazardous wastes include sludge generated with wastewater treatment, spent oil, used fluorescent lamps, spent thinners. All these except for thinner are incinerated in an incinerator installed in the plant premises to reduce the volume of the wastes. The sludge contains water so much that it does not burn by itself; therefore, LPG is burned to incinerate its organic components. The incineration ash, consisting mainly of SiO_2 and Al_2O_3 , may contain heavy metals; therefore, it cannot be disposed of at any place except at designated areas where strict control is exercised on the wastes. During the survey period, the plant installed a storage facility shown in Figure 2-4-2, similar in structure to the controlled landfill facility of Japan, so that the plant would not have to worry in future about disposal of incineration ash in Vietnam where such a facility is not provided. The walls and floor of the container are of concrete structure. The container is 40m long and 15m wide, and is installed 5m deep from the ground surface. The roof is movable and designed to prevent rainwater from entering the container. The bottom is slanted and the capacity is about $1,500\text{m}^3$, capable of storing 10 years of ash, produced about 0.4m^3 a day. Company H expects the government of Vietnam to install a duly controlled final disposal site before the container becomes full.

The valuable wastes are easily recyclable. The general wastes include scrap iron, materials used for packing, empty cans. The hazardous wastes include gasoline. Dealers not associated with the company come and buy these wastes.

Figure 2-4-1 Type and Treatment of Wastes of Company H

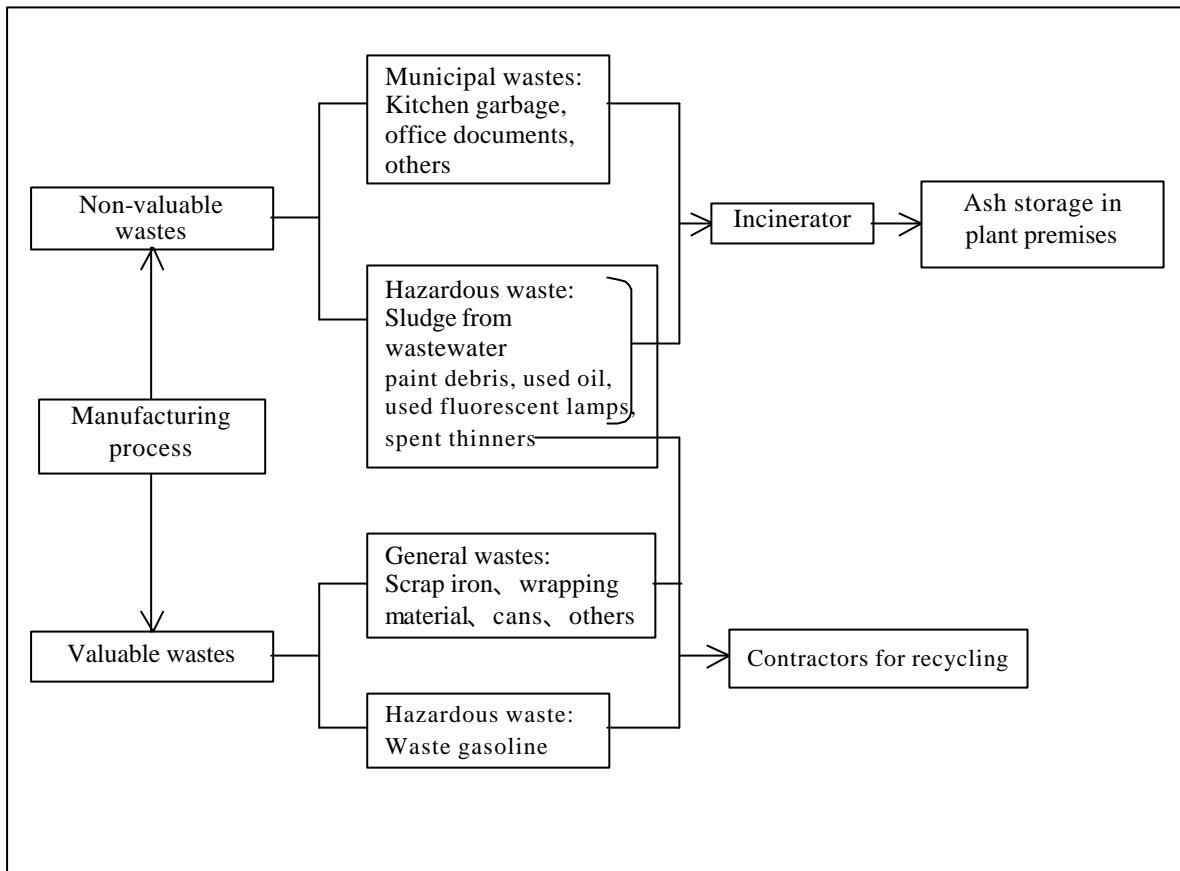
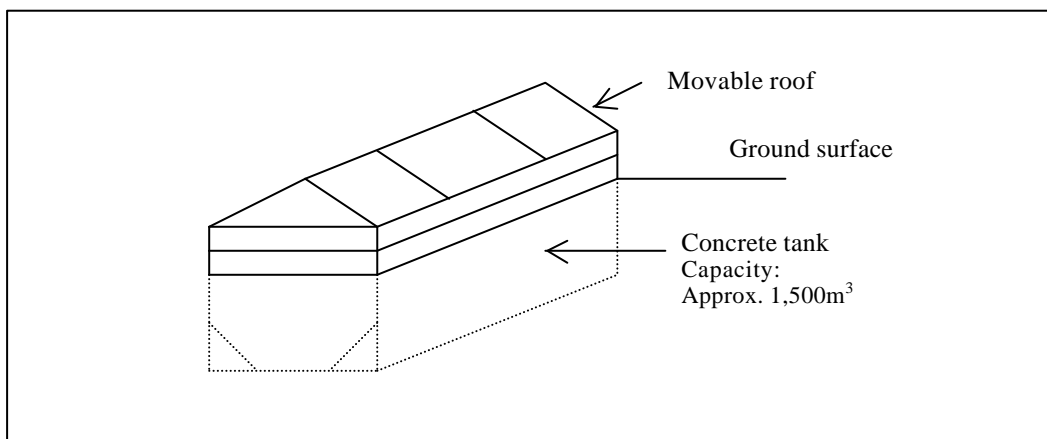


Figure 2-4-2 Structure of Incineration Ash Storage Container of Company H



Case 9 Example of Returning Byproducts to Farmland at Cost

1) Outline of the Company

Company I
Business line: Manufacture of chemical seasoning agent
Number of employees: 527
Start of operation: 1993
Location of the plant: An industrial estate in Dong Nai Province about 20km to the east of Ho Chi Minh City
Japanese equity ratio: 79%

2) Background

The parent company of Company I deploys its group companies in various countries of the world, and is world famous. The parent company has set its basic environment policy for itself and for its group companies. Clause 1 of the basic environment policy states that its overseas group companies should always watch environmental policies and regulations of their respective countries and should adequately respond to them, and to establish their own standards so that they may systematically promote their environmental policies.

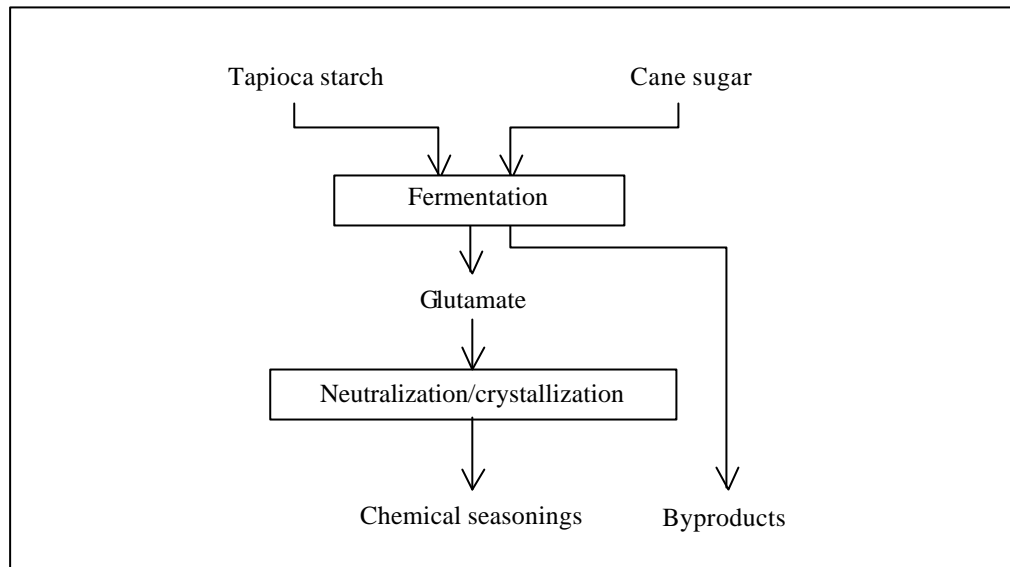
The process of manufacturing the chemical seasoning agent produces a large amount of liquid byproduct containing organic substances. If discharged to rivers, the liquid byproduct causes water pollution. If the Company causes an environmental problem, it runs counter to the basic environment policy of the parent company. Besides, it seriously damages image of all group companies. The Company then decided to return the liquid byproduct to farmland to utilize its fertilizer effects. The existence of farm households in the surrounding, or a secure route for returning the liquid waste to farmland, is one of the reasons for locating the plant in this industrial estate.

The industrial estate in which the plant is located is an old one and it does not have a central wastewater treatment facility. The wastewaters from plants in the industrial estate are discharged to a river flowing nearby. The wastewater effluent standards set for Company I are A level standards, the standards applicable to effluent waters discharged to sources of drinking water. Company I decided to conform to the standards by installing an advanced wastewater treatment facility rarely seen even in Japan.

3) Measures Taken by the Company

a. Generation and Utilization of the Byproduct

Figure 2-4-3 schematically outlines the process to generate the byproduct. The plant feeds tapioca starch and molasses, the latter being a residue left after sugar is produced from sugarcanes. These raw materials are fermented and the glutamic acid generated is extracted as product. The extraction residue is the byproduct. The production of the byproduct, of which water content is more than 90%, is 80,000 tons a year. The byproduct contains organic substances at high concentrations; therefore, it causes water pollution if discharged to a river untreated, a waste difficult to deal with. The byproduct contains nitrogen, an effective ingredient as fertilizer, at 5% and some minerals that are added during the process of fermentation. However, the contents of effective ingredients are lower compared with those of chemical fertilizers, and its very high water content makes commercial transportation prohibitive. Accordingly, this byproduct is not salable as fertilizer as it is.

Figure 2-4-3 Process to Generate the Byproduct of Company I

The company took the following measures.

- The byproduct is acidic as generated. Company I adds alkalis to neutralize it so that it may not do any harm after administered to farmland.
- Company I asked an agricultural research institute to study its effect as fertilizer and to confirm that it does not exhaust soil fertility. After having confirmed these, the Company registered it as a fertilizer.
- Company I developed a staff of experts exclusively for this byproduct and has stationed one person in each province. The expert visits farm households by motored bicycle to explain its fertilizer effects and right methods for use. The byproduct is effective particularly to sugarcanes and rubber trees.
- Company I delivers the liquid byproduct by tank truck and sprinkles it on the farmland.

Company I sells the liquid byproduct as fertilizer to farm households in the above manner. However, the sales revenue is far below the cost for the above measures. The major cost items are neutralization cost and transportation cost. The Company loses about 80 million yen a year. Nevertheless, the Company returns this byproduct to the farmland, because this is the only way to use the byproduct without causing environmental contamination.

b. Wastewater Treatment

The plant produces a combined volume of 600m³/day of wastewater from the raw material treatment, fermentation, neutralization and decolorizing processes. The strictest standards of the government of Vietnam, Standard A, are applied to this wastewater. These standards are normally applied to waters discharged to sources of drinking water. Basically, Company I should conform to all items of A level standards; however, the Company is required to report on the items given in Figure 2-4-4. Figure 2-4-4 also gives specified values for these items.

The standards are stricter than the Japanese national standards for almost all items. Of these, the standard for ammonia nitrogen (NH₃-N), 0.1mg/liter, which the quality of the plant's wastewater concerns, is very strict in view of the fact that the river water to which the treated wastewater is discharged, contains ammonia nitrogen close to 1mg/liter. The effluent standards of autonomous bodies of Japan, stricter than the national standards, are not as strict as this with respect to ammonia nitrogen.

Figure 2-4-4 Wastewater Effluent Standards for Company I

(Unit: mg/liter except for temperature, pH and coliform group number in MPN/100ml)

Item	Temp.	pH	BOD	COD	SS	As	Hg	Pb
Standards	40	6-9	20	50	50	0.05	0.005	0.1
Item	Cu	Fe	CN	Oil	T-N	NH ₃ -N	Res.-Cl	Coliform
Standards	0.2	1	0.05	N.D.	30	0.1	1	5000

The plant installed a wastewater treatment facility equipped with the nitrification and denitrification process to conform to this standard to the extent possible. The nitrification and denitrification process converts ammonia dissolved in the process wastewater into nitrate nitrogen by the action of aerobic bacteria, followed by reduction of the nitrate nitrogen by the action of anaerobic bacteria into nitrogen gas to be released to the atmosphere. The process requires minute operation control technologies. Even with nitrification and denitrification it was found difficult to reduce the ammonia nitrogen content to 0.1mg/liter; therefore, Company I obtained a tentative relax of this standard to 4mg/liter from the Department of Science, Technology and Environment (DOSTE) of Dong Nai Province. Presently, the concentration of ammonia nitrogen in the treated wastewater is 1mg/liter, conforming to the tentative standard by a good margin.

The wastewater is analyzed twice a year on the samples taken at 4 locations; namely, the discharge point to the river, outlet of biological treating facility, well water near the wastewater treatment facility, and the river water. The officers of DOSTE come to take samples. The plant measures pH, COD, and SS at its laboratory for its own control purpose once a week. The laboratory produces wastewater containing chromium and other hazardous substances, which is very little but not to be discharged. This laboratory wastewater is stored in plastic bottles. The plant will treat the laboratory wastewater according to the government policy on treatment and disposal of hazardous wastes, and the company is now waiting for the government to decide on this issue.

c. Waste

The plant produces such wastes as gypsum generated from neutralization of the raw material, activated carbon used for decolorizing the product, wastewater sludge. Gypsum is produced at a rate of 300tons/year, all of which is used as soil conditioner by farm households free of charge. Activated carbon, produced also at a rate of 300tons/year, is used as fuel for brick burning. Both gypsum and activated carbon are supplied to the users free of charge but the transportation fees are borne by the users. The wastewater sludge contains nitrogen; therefore, it is blended into the byproduct fertilizer product.

d. Exhaust Gas

The plant operates a fuel-oil-burning boiler. In Vietnam, a fuel oil containing sulfur at 3% is the only fuel oil commercially available. It is difficult to conform to the sulfur oxides emission standard of 1,000mg/m³ with this fuel. Through negotiations with the Department of Science, Technology and Environment (DOSTE) of Dong Nai Province, non-compliance to the standard is tolerated on condition that the plant will take such measures as procurement of a fuel oil of lower sulfur content by 2005. The DOSTE of Dong Nai Province deals with difficult problems rather practically.

e. Others

The plant acquired the ISO14001 certification in January 2001. The plant was able to obtain the certification relatively easily, because the plant selected the routinely conducted environmental measures as the theme for ISO14001 application.

Company I assigns a person to routinely monitoring information on the Internet regarding the 18 items of the laws that may affect the operation of Company I so that the company may take prompt measures.

Case 10 Example of Selling all Wastes as Resources

1) Outline of the Company

Company J
 Business line: Manufacture of automotive wiring units
 Number of employees: 900
 Start of operation: 1997
 Location of the plant: An industrial estate to the east of Hanoi
 Japanese equity ratio: 70%

2) Background

Company J produces automotive wiring units, of which more than 80% is exported to Japan. The manufacturing process is labor intensive. Accordingly, the company was established in Vietnam where labor cost was low; however, the Company is forced to reduce the cost in the face of harsh competition. Under such a condition, the Company sells as resource copper wire scraps and coating materials produced at the manufacturing process. The industrial estate in which Company J is located is of Vietnamese capitals.

3) Measures Taken by the Company

a. Waste

The copper wire scraps, cardboards and waste paper, wood chips produced at the manufacturing process are all sold to a dealer. The dealer is not the Hanoi Urban Environmental Company (URENCO) but a private company. The dealer buys copper wire at 10,000 Vietnamese Dong/kg (about 90 yen/kg), cardboards and waste paper at 1,000 Vietnamese Dong/kg (about 9 yen/kg) and wood chips at a much lower price.

b. Wastewater Treatment

The plant produces sanitary wastewater only. The night soil and wastewater from the canteen are discharged respectively through a simple septic tank and directly to a river. There are no standards for these kinds of wastewaters. Since the industrial estate does not have a central wastewater treatment facility, the wastewaters from plants are discharged directly to the river.

c. Expropriation of Land by the Industrial Estate

The plant obtained a piece of land in the expanded portion of the industrial estate to expand the plant. The industrial estate reportedly had a hard time obtaining neighboring farmland and the expropriation took very long. In Vietnam, all the land belongs in principle to the state and the people have the rights to use the land for a period of 30 years. Actually, however, one's rights to use land is virtually his/her ownership of the land, his/her rights can be sold or inherited. Business enterprises can depreciate the cost of obtaining the rights to use land. The industrial estate obtained the land from farm households on condition that the farmers could become employees of the tenant companies.

d. Others

In Vietnam solid wastes are collected without being sorted previously. Such recyclable wastes as glass bottles, cans, and waste paper are manually sorted after collection. At the present low cost of manpower in Vietnam, recycling of waste can be promoted by manual sorting.

Case 11 Example of Converting All Wastes into Resources

1) Outline of the Company

Company K
Business line: Manufacture of sanitary ware
Number of employees: 250
Start of operation: 1998
Location of the plant: 10km to the east of Hanoi city center
Japanese equity ratio: 70%

2) Background

Company K makes molds with gypsum, pours porcelain clay into the molds to form ceramic ware of right shape, dries them, applies glaze on them, fires them in a kiln to make the sanitary ware, and inspects the products. Company K has all processes for manufacturing sanitary ware. These processes produce such wastes as obsolete gypsum molds, defective porcelain ware, and packing materials. The plant produces 36,000units/month, representing a largest share in Vietnam, or 40%. The amount of wastes is correspondingly large. Sanitary ware is meant to improve environment; therefore, the Company was in a position to avoid causing environmental problems with its wastes. The Company therefore sought to recycle wastes into resources by all means. The Company sells everything that is salable to reduce cost.

3) Measures Taken by the Company

a. Recycling of Wastes into Resources

The gypsum mold normally breaks after it has been used 120 times. The plant crushes broken molds into pieces, and broken fragments are sold as cement raw material. The crushed mold fragments are further ground and mixed with other raw materials to be burned in the cement kiln. Defective sanitary ware products are crushed into small pieces and sold as aggregates for cement concrete.

The wastewater produced in the manufacturing processes contains particles of porcelain clay. The wastewater is rid of clay particles by sedimentation by coagulation. The supernatant clean water is used for cleaning the plant. Basically, wastewater dose not mean to be discharged outside the plant premises. In case the amount of wastewater is large, however, the wastewater can temporarily overflow the sedimentation tank and flows outside the plant premises. The sludge from sedimentation is sun dried in a concrete pit. The dried sludge is sold to a ceramic industry nearby as a raw material clay for insulators. Since the sludge contains a flux, sludge helps melt the raw materials at lower temperatures and is convenient to use, according to the ceramic industry.

The plant uses glazes imported only from Japan, which do not contain hazardous substances. The glaze left in vessels is collected and used again. None of the glazes becomes a waste.

b. Others

The plant uses 6,500m³/month of groundwater, which is hard water and is used after demineralization.

The plant burns 125,000liters/month of kerosene and 7,000kg/month of LPG. Their sulfur contents are very low and their effluent gases do not cause environmental problems.

The wood used for wood frames is sold. Such packing materials as plastic tapes are burned in the incinerator in the plant premises.

The plant manufactures water-saving type sanitary ware, which consumes only 4.5 to 6 liters of water per flushing, compared with 8 to 9 liters per flushing of the traditional type. In Vietnam, people are becoming to buy water-saving type sanitary ware.

Section 5

Cases of Innovative Environmental Conservation Measures

Other than those previously mentioned, there are a number of Japanese companies taking various innovating measures, on the principle that Japanese companies should never cause environmental problems to foreign countries where they have advanced, and should show good examples of environmental conservation. Some industrial estates of Japanese capitals have a termination clause in their tenant contracts enabling the industrial estate to terminate the tenant contract with a tenant if the tenant violates environmental standards. A certain industrial estate includes alkyl mercury and PCBs, substances strictly controlled in Japan but not included in the Vietnamese standards, in its autonomous wastewater effluent standards. Another Japanese company has installed its wastewater treating facility underground, considering aesthetic appeal of the plant in addition to meeting the effluent standards.

Case 12 Example of Including Termination Clause in its Tenant Contract of Industrial Estate for a Non-conforming to Environmental Conservation

1) Outline of the company

Company L
Business line: Industrial estate management
Number of employees: 30
Start of operation: 1998
Location of the industrial estate: Dong Nai Province 30km to the east of Ho Chi Minh City
Japanese equity ratio: 60%

2) Background

Japanese parent company of Company L is an internationally known commercial company. However, the parent company had had no experience in direct management of industrial estates before this industrial estate. Some of its European clients, manufactures of sporting goods, demand its suppliers to take serious measures for environmental conservation. The Company considers it necessary to take effective environmental measures, fully involving its affiliates, in order to protect and enhance the public image to the company’s brand, and that this is a firm trend in the world. If a tenant causes an environmental problem, other tenants also suffer. Besides, it would have adverse effects on the sale of estate’s plots. Therefore, the industrial estate managing company makes it clear in the termination clause in the tenant contract that the Company reserves the right to retire the tenant if it repeats violating the environmental rules.

3) Measures Taken by the Company

a. Environmental Items to Observe

The tenant contract is composed of three parts. One part is similar to the land leasing contract, on which the tenant applies to the government for permission of plant operation. On obtaining the permission, the industrial estate managing company and the tenant proceed with the formal contract. The environmental items to observe are contained in the internal rule on which both parties must agree as a supplemental agreement. The termination clause states that the tenant must rectify the situation within a given period if the tenant fails to observe the environmental items, and that if the tenant cannot rectify the situation, the tenant contract is terminated and the tenant must leave the industrial estate. Actually, the supply of electricity and water is suspended to shutdown the tenant’s operation to execute the termination clause.

Company L consigned a British law firm to prepare the contract, which was instrumental in securing observance of the environmental items. When the Company receives an inquiry, the Company explains this termination clause and endeavor to persuade the potential client to accept the termination clause. Japanese companies usually accept this termination clause.

b. Others

Tenants were required to prepare detailed environmental impact statements around 1997 when they planned to build plants. Recently, the process has been simplified. All they have to do are to state kinds and amounts of pollutants they will produce, the methods of treatment for the pollutants, and to submit registration forms stating that they will abide by the law. Company L assists the tenants to obtain permissions using the standard forms for registration.

The A level effluent standards are applied to the effluent water discharged from the estate’s central wastewater treatment facility to the river. Company L also applies the A level standards to the effluent streams from tenants except for BOD and COD, to which more lenient standards are applied. The central wastewater treatment facility treats BOD and COD only by a biological treatment, leaving treatment of such other hazardous substances as heavy metals, cyanides to the tenants, before sending wastewaters to central wastewater treatment facility. Officers of the Department of Science, Technology and Environment (DOSTE) of Dong Nai Province come to take samples of effluent water once a year.

The Company receives instructions from DOSTE for improvements.

Regarding solid wastes, Company L refers a public treating company to the tenants, but let the tenants seal contracts with the treating company. Some private dealers come to buy valuable wastes.

The Ministry of Construction instructs Company L to secure green area at 20% in the common area and tenants' premises.

Case 13 Example of Setting Additional Standards of Alkyl Mercury and PCBs for the Tenants in an Industrial Estate

1) Outline of the Company

Company M
 Business line: Industrial estate management
 Number of employees: 30
 Start of operation: 1997
 Location of the industrial estate: In Hai Phong City, 85km to the east of Hanoi
 Japanese equity ratio: 70%

2) Background

Japanese parent company of Company M is a famous developer, with plenty of experience in overseas industrial estate development. It is the parent company's motto to give sufficient environmental consideration in the management of industrial estates; therefore, Company M instructs the tenants to abide by the regulations on environmental conservation. Company M asks the tenants to understand that it is important for the industrial estate not to cause environmental problems in order to protect the tenants. One of the parent company's basic policies is that the company does not relax environmental standards overseas compared with those of Japan.

Alkyl mercury and PCBs in the effluent water standards are known to be chemical substances that have caused the Minamata disease and Kanemi oil symptoms, respectively. These substances are therefore strictly controlled in Japan; however, the Vietnamese official standards do not regulate them.

3 Measures Taken by the Company

a. Effluent Water Standards Applied to the Tenant

This industrial estate has a biological treating facility. The effluent water from the industrial estate meets all the requirements of the B level standards that the government imposes on this industrial estate, and is discharged to a river. Since the biological treating facility can cope with a limited number of items, the tenants have to treat their wastewaters for heavy metals and other hazardous substances, which the central wastewater treatment facility cannot eliminate, before sending their wastewaters to the central wastewater treatment facility. Figure 2-5-1 shows values for the standards applied to the tenants.

Figure 2-5-1 Wastewater Standards Applied to the Tenants

(Unit: mg/liter except for pH and temperature)

Item	pH	Temp.	BOD	COD	SS	heavy metals, other hazardous substances	Alkyl mercury	PCB
Standards	5-9	45	500	500	600	Limitation values of Standard B regulated by Vietnamese Gov.	N.D.	0.003
(ref.) Standard B (Vietnam)	5.5-9	40	50	100	100	see figure 1-4-1		

The standards for BOD, COD and SS (suspended solids) are much more lenient than the government standards, because these pollutants can be treated by the central wastewater treatment facility of the industrial estate. The tenants are required to treat heavy metals and other hazardous substances to the values meeting the B level standards before sending their wastewaters to the central treating facility. The standard for alkyl mercury specifies "not detected" as is the case with the standard of the government of Japan. The standard for PCBs specifies 0.003mg/liter, the value equivalent to the standard of the government of Japan. Presently, no tenant directly handles alkyl mercury; however, inorganic mercury is present in the surroundings as in fluorescent lamps. It is established that inorganic mercury is converted into alkyl mercury by the action of microorganisms; in other words, alkyl mercury can occur at

unexpected places. This industrial estate gives consideration to such contingencies.

Company M collects reports on analytical results of wastewaters from the tenants at intervals ranging from once in six months to once in three months depending upon the type of industry. All the tenants should report analyses on 5 items; namely, temperature, pH, COD, BOD, and SS. Tenants are required to report on other additional items depending upon the type of industry. The effluent water from the central wastewater treatment facility satisfies all the items of Standard B of the government of Vietnam. The results of analysis of effluent water are kept always ready for submission to the Department of Science, Technology and Environment (DOSTE) of Hai Phong. The City of Hai Phong is the joint venture partner of Company M, and the city trusts the company so much that the city authority has never demanded results of analysis or conducted an on-site inspection.

If a tenant violates the standards, the tenant is warned. If a tenant repeatedly violates the standards, Company M and the city authority jointly force the tenant to close the plant.

b. Others

Each tenant deals with its solid wastes. The tenants' products are basically manufactured from imported raw materials and meant to be exported. Therefore, even wastes must be inspected by the customs, if the wastes are valuable. The difference in weight between the imported raw materials/parts and the products is regarded as wastes, which can be sold, if valuable, in Vietnam after due procedures for customs clearance. Such non-valuable wastes as canteen garbage are consigned for disposal to Hai Phong Urban Environment Company or private companies at some costs. Farmers in the neighborhood also come to take garbage as animal feed.

Case 14 Example of Treating Wastewater of High Pollutant Content by a Facility Installed Underground

1) Outline of the Company

Company N
Business line: Manufacture of dried vegetables
Number of employees: 232
Start of operation: 1999
Location of the plant: An industrial estate in the south of Ho Chi Minh City
Japanese equity ratio: 100%

2) Background

As much as 90% of the dried vegetables Company N produces is exported to Japan to be used for instant noodles, miso soup and other soups. Company N’s products have a high share of 70% in the Japanese market; therefore, any environmental problem by Company N, if it ever occurs, would have serious impacts upon the entire food industry of Japan.

The vegetable broth produced from the vegetable boiling process contains BOD at high contents. The industrial estate has a wastewater treatment facility, with biological treating playing the major role, which can accommodate a wastewater-containing BOD up to 500mg/liter. BOD of the vegetable broth of Company N exceeds this limit. Accordingly, the plant had to install a wastewater treatment facility to give a pretreatment to the broth. In addition, the plant must be neat and clean throughout, because the plant handles food. The plant, therefore, preferred to install a compact and inconspicuous wastewater treatment facility than install outdoors an ordinary biological treating facility, with an aeration tank containing a vigorously stirred brown liquid.

3) Measures Taken by the Company

a. Wastewater Treatment

The plant subjects vegetables to a series of processes from washing, boiling, sizing, vacuum freeze drying, to manufacture dried vegetables. Wastewaters are produced from the washing process and boiling process. The administrative office of the industrial estate applies the effluent standards shown in Figure 2-5-2 to the plant. It may be noted that standards for COD and BOD are rather lenient, because the biological treatment of the industrial estate’s central wastewater treatment facility is effective in eliminating COD and BOD. The B level standards of the government of Vietnam are applied to items not shown in this figure.

Figure 2-5-2 Wastewater Acceptance Standards of the Central Wastewater treatment facility of the Industrial Estate in Which Company N is Located

(Unit: mg/liter except for pH)

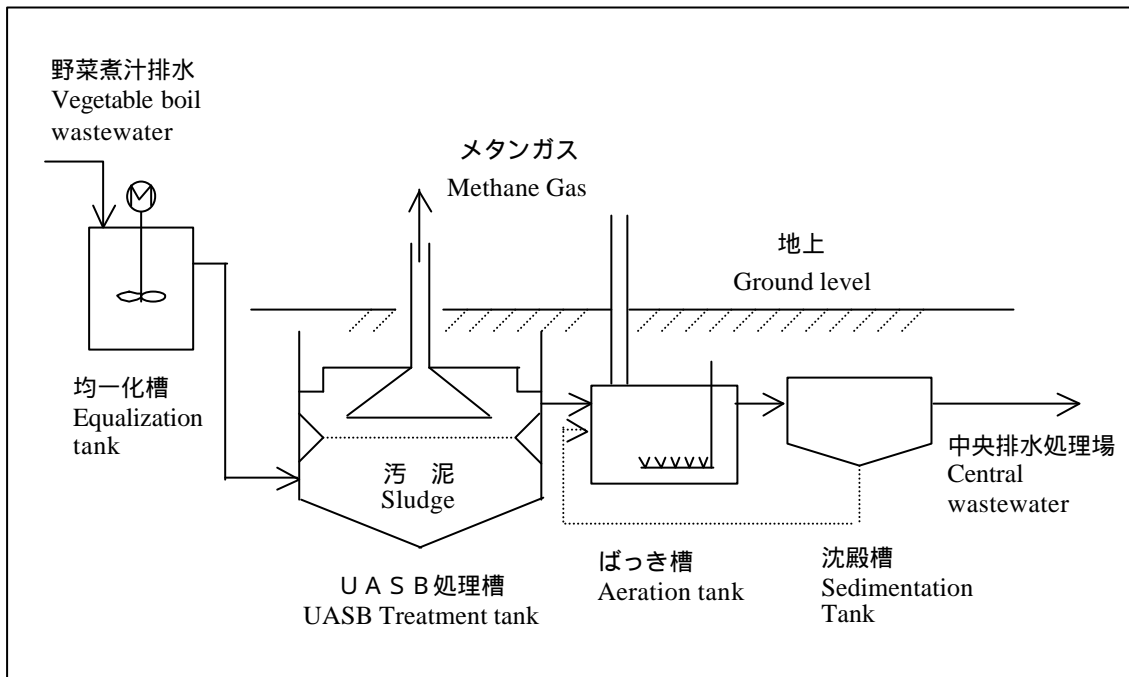
Item	pH	COD	BOD	SS
Standards	5 – 9	800	500	100

The boiling process produces vegetable broth at a rate of 150m³/day, of which BOD content can exceed 1,000mg/liter. The plant had to install a compact wastewater treatment facility capable of reducing the BOD content to 500mg/liter. Company N consigned a private company specializing in environmental technology with the design of this facility. Ho Chi Minh University of Technology gives technical assistance to this Company. This Company has reportedly introduced Danish technologies. In addition to the vegetable broth, the plant produces 350m³/day of washing wastewater, containing BOD at less than 500mg/liter, which is directly sent to the central wastewater treatment facility.

Figure 2-5-3 outlines the wastewater treatment facility. The wastewater from the boiling process is first retained in the equalization tank; then it is sent to the Upflow Anaerobic Sludge Blanket (UASB) tank where the high-BOD wastewater flows upward with sludge flocs of anaerobic microorganisms. There, organic compounds are decomposed by methane fermentation. The decomposition proceeds fastest at

temperatures from 53 to 55°C, enabling the compact reaction vessel to accommodate a large load. This treatment is best suited to the broth produced at high temperatures. The wastewater is further treated by an aeration tank to reduce BOD to less than 500mg/liter and is sent to the central wastewater treatment facility. These components of the wastewater treatment facility are arranged in a very compact fashion and are placed underground. There is just a small room aboveground for housing pumps and blowers, which does not in any way impair cleanliness of the plant. The wastewater sludge produced from the sedimentation tank is recycled back to the aeration tank. There is no excess sludge at normal operation to be taken out of the system.

Figure 2-5-3 Outline of Wastewater treatment facility



Case 15 Example of Positively Promoting Environmental Measures Employee's Environmental Awareness

1) Outline of the Company

Company O
Business line: Manufacture of large industrial pumps
Number of employees: 50
Start of operation: 1999
Location of the plant: In Hai Duong Proving 60km to the east of Hanoi
Japanese equity ratio: 70%

2) Background

Company O is a joint-ventured company by a Japanese company and a local company of a long experience of pump manufacturing, with technologies of the former Soviet Union, and started operation only recently. The local joint venture partner's environmental consideration was not necessarily enough. Under such a circumstance, Company O's Japanese parent company, being well known as environment-related industry, was required to give sufficient environmental consideration to the plant, and to build a model plant for environmental conservation. Since the joint venture partner provided the plant site, the plant was built next to the joint-venture partner's plant.

3) Measures Taken by the Company

a. Waste

The plant has all the operations for manufacturing pumps, from manufacture of wooden patterns for casting pump casings, or pump bodies, manufacture of sand molds, casting, assemblage, and performance tests of pumps. The casting process produces wood dust and sand dust, and that of assemblage produces metal chips from cutting and a large amount of oil-stained cloth. In order to prevent them from being scattered, the plant promotes education of employees, with the 5S movement included in the curriculum. The employees must be educated to enhance their environmental awareness, to rid themselves of the common custom of absent-mindedly throwing away wastes. The plant began sorted collection of wastes, following the precedent of the Japanese parent company, and the sorted collection proved effective. Just a visual comparison between this plant and the joint-venture partner's plant next door is enough to be convinced that this plant is much more orderly than the joint-venture partner's plant.

The wood dust and waste cloth are taken off by the Waste Treatment Public Corporation of Hai Duong Province, together with such general wastes as waste paper. The metal chips generated from cutting cast products are sold to private waste treating companies as scrap iron.

b. Wastewater Management

The plant produces virtually no industrial wastewater. The plant produces about 100tons/month of night soil. The night soil is fermented in a septic tank and the supernatant clean water is discharged, as is commonly done in Southeast Asian countries. The authority of Hai Duong Province applies Standard B to this water. The standards include 3 items, which are not specified in the government B level standards; these are transparency, electric conductivity and hardness. The provincial authority has not informed the plant of the specified values of these items. Officers of the Department of Science, Technology and Environment (DOSTE) of Hai Duong Province come to the plant to take samples of this water once a year. The officers take 6 samples from locations other than the effluent water, including pits in the plant. DOSTE informs the plant of the results of analysis. DOSTE also comes to the joint-venture partner's plant to take samples.

c. Working Environment Management

The officers of DOSTE of Hai Duong Province come to the plant to monitor the working environment once a year. The officers measure concentrations of dust, sulfur dioxide, nitrogen oxides, carbon monoxide and noise levels at 6 locations. DOSTE also informs the plant of the results of measurements.

The control of working environment is generally strict in Vietnam to protect workers in general. The officers of DOSTE of Hai Duong Province come to make measurements for both environmental management and working environment management.

d. Others

Company O promotes preparations for acquiring the ISO14001 certification. In compliance with the policy of the Japanese parent company, Company O plans to acquire the certification around 2005, or 2 to 3 years later, from the certification body from which Company O acquired the ISO9000 certification. The joint-venture partner is not at all interested in such a matter as the certification.

When an amendment is made of the environment-related laws or regulations, the Hai Duong Province authority holds a lecture. The Company has the Vietnamese in charge attend the lecture.

One of the problems Company O faces in environmental education of the employees is that none of them speaks English. The Company sends some of the employees to Japan for training for about five months. During the training period they are given training on Japanese, as a common language in the plant. Some of the best have become so fluent that they can talk in Japanese with Japanese engineers visiting the plant.

Case 16 Example of Discharging Concentrated Spent Sulfuric Acid with Strict pH Control

1) Outline of the Company

Company P
 Business line: Manufacture of facilities for transporting wafers for semiconductor product manufacturing processes
 Number of employees: 400
 Start of operation: 1989
 Location of the plant: An industrial estate in Hai Phong City, 85km to the east of Hanoi
 Japanese equity ratio: 100%

2) Background

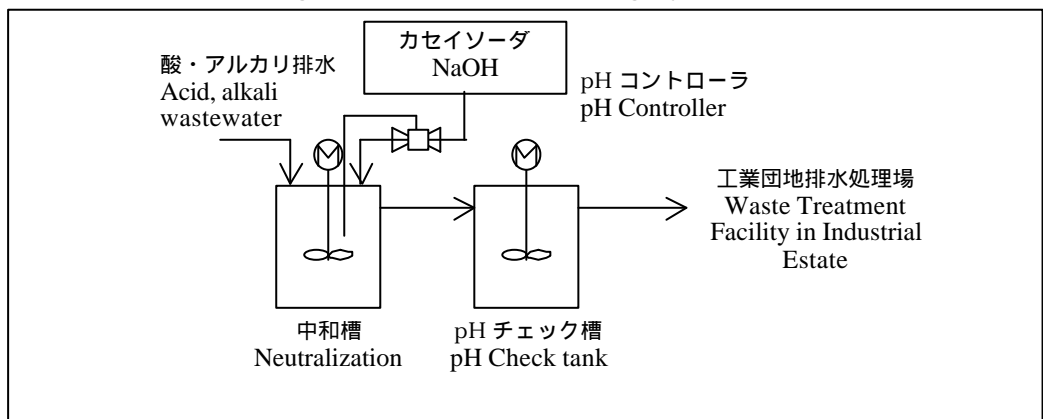
Company P gives anodizing treatment to aluminum materials to impart corrosion resistance and abrasion resistance to the aluminum surfaces. The anodizing process gives the materials an electrolytic treatment in a concentrated solution of sulfuric acid at around 25%. When the electrolytic solution has become deteriorated, the entire solution has to be replaced. The replacement produces a large amount of spent concentrated sulfuric acid. Unless the spent sulfuric acid solution is neutralized with minute care, the plant risks discharging a wastewater, of which the pH value deviates greatly from the specified value.

3) Measures Taken by the Company

a. Wastewater Treatment

The plant discharges 3 kinds of wastewaters totaling 3,000liters/month, an alkali wastewater from degreasing process of the ground aluminum parts, a weak acid wastewater from washing process of finished anodized aluminum products, and a concentrated sulfuric acid wastewater from replacement of the electrolytic solution. The pH value of the sulfuric acid wastewater is very low at or less than 0.5. This wastewater has to be neutralized to pH value from 5 to 9, the range acceptable to the wastewater treatment facility of the industrial estate. The wastewaters conform without treatment to items other than pH set by the government of Vietnam. The plant controls the pH value of the wastewater by a control system shown in Figure 2-5-4. The plant asks an analysis company to analyze the quality of the wastewater once a month, and reports the results of analysis to the industrial estate.

Figure 2-5-4 pH Controlling System



b. Others

A local dealer comes to buy aluminum and stainless steel chips produced at a rate of 5 to 8tons/month.

Company P obtains information on environment-related laws and regulations from the Hai Phong Export Processing and Industrial Zone Authority (HEPIZA), the Hai Phong City People’s Committee Office, which manages the industrial estate.

<Appendices>

Appendix 1

Law on Environmental Protection (LEP)

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

**NATIONAL ASSEMBLY
OF
THE SOCIALIST REPUBLIC OF VIETNAM
IX Legislature, 4th Session
(from 06 to 30 December 1993)**

**LAW
ON ENVIRONMENTAL PROTECTION**

The environment is of special importance to the life of humans and other living creatures as well as to the economic, cultural and social development of the country, the nation and mankind as a whole.

In order to raise the effectiveness of state management and the responsibilities of the administration at all levels, of state agencies, economic and social organizations, units of the People's Armed Forces and all individuals with respect to environmental protection with a view to protecting the health of the people, ensuring the right of everyone to live in a healthy environment and serving the cause of sustainable development of the country, thus contributing to the protection of regional and global environment;

Pursuant to Article 29 and Article 84 of the 1992 Constitution of the Socialist Republic of Vietnam;
This law provides for the protection of the environment.

**Chapter
GENERAL PROVISIONS**

Article 1

The environment comprises closely inter-related natural factors and man-made material factors that surround human beings and affect life, production, the existence and development of man and nature.

Environmental protection as stipulated in this law includes activities aimed at preserving a healthy, clean and beautiful environment, improving the environment, ensuring ecological balance, preventing and overcoming adverse impacts of man and nature on the environment, making a rational and economical exploitation and utilization of natural resources.

Article 2

In this law the below-cited terms shall have the following meanings:

1- Components of the environment mean factors that constitute the environment: air, water, soil, sound, light, the earth's interior, mountains, forests, rivers, lakes, sea, living organisms, ecosystems, population areas, production centers, nature reserves, natural landscapes, famed beauty spots, historical vestiges and other physical forms.

2- Wastes mean substances discharged from daily life, production processes or other activities. Wastes may take a solid, gaseous, liquid or other forms.

3- Pollutants mean factors that render the environment noxious.

4- Environmental pollution means alternation in the properties of the environment, violating environmental standards.

5- Environmental degradation means qualitative and quantitative alteration in the components of the environment, adversely affecting man's life and nature.

6- Environmental incidents mean events or mishaps occurring in the process of human activities, or abnormal changes of nature causing serious environmental degradation. Environmental incidents may be caused by:

a) Storms, floods, droughts, earth cracks, earthquakes, landslides, ground subsidence, volcanic eruptions, acid rain, hails, climatic changes and other natural calamities;

b) Fires, forest fires, technical failures at production or business establishments or in economic, scientific, technical, cultural, social, security or defense facilities, causing damage to the environment;

c) Accidents in the prospecting, exploration, exploitation or transportation of minerals or oil and gas, pit collapse, oil spouts and spills, pipeline breaks, shipwrecks, accidents at oil refineries and other industrial establishments;

d) Accidents in nuclear reactors, atomic power plants, nuclear fuel producing or re-processing plants or radioactive material storages.

7- Environmental standards mean norms and permissible limits set forth to serve as a basis for the management of the environment.

8- Clean technology means a technological process or technical solution either causing no environmental pollution or generating pollutants at the lowest level.

9- Ecosystem means a system of groups of living organisms existing and developing together in a given environment, interacting with one another and with that environment.

10- Biodiversity means the abundance in gene pools, species and varieties of living organisms and ecosystems in nature.

11- Environmental impact assessment (E.I.A) means the process of analyzing, evaluating and forecasting the effects on the environment by socio-economic development projects and plans, by production and business establishments, and economic, scientific, technical, medical, cultural, social, security, defense or other facilities, and proposing appropriate solutions to protect the environment.

Article 3

The State shall exercise unified management of environmental protection throughout the country, draw up plans for environmental protection, build up capabilities for environmental protection activities at the central and local levels.

The State shall adopt investment policies to encourage organizations and individuals at home and abroad to invest under different forms in, and apply scientific and technological advances to, environmental protection, and protect their lawful interests therein.

Article 4

The State shall be responsible for organizing the implementation of education, training, scientific and technological research activities and the dissemination of scientific and legal knowledge on environmental protection.

Organizations and individuals shall be liable for participating in the activities mentioned in this Article.

Article 5

The State shall protect national interests with regard to natural resources and the environment.

The State of Vietnam shall broaden cooperative relations with other countries in the world, with foreign organizations and individuals in the field of environmental protection.

Article 6

Environmental protection is the common cause of the entire population.

All organizations and individuals shall have the responsibility to protect the environment, observe the environmental protection legislation, have the right and obligation to detect and denounce any act in breach of the environmental protection legislation.

All foreign organizations and individuals operating on Vietnamese territory shall abide by Vietnam's environmental protection legislation.

Article 7

Organizations and individuals making use of components of the environment for production or business purposes shall, if necessary, contribute financially to environmental protection.

The Government shall regulate the circumstances, levels and modalities for the financial contribution mentioned in this Article.

Any organization or individual whose activities cause damage to the environment shall make compensation therefore according to regulations by the law.

Article 8

The National Assembly, the People's Councils, the Vietnam Fatherland Front and its member organizations, within the scope of their tasks and powers, shall be responsible for the control and supervision of the implementation of the environmental protection legislation.

The Government and the People's Committees at all levels shall be responsible for organizing the implementation of the environmental protection legislation.

Article 9

All acts causing environmental degradation, environmental pollution or environmental incidents, are strictly prohibited

Chapter PREVENTION AND COMBAT AGAINST ENVIRONMENTAL DEGRADATION ENVIRONMENTAL POLLUTION AND ENVIRONMENTAL INCIDENTS

Article 10

The State offices, within the scope of their functions and tasks, shall be responsible for organizing the investigation, study and evaluation of the existing conditions of the environment, periodically reporting to the National Assembly on the current status of the environment; for identifying areas of environmental pollution and notifying the public thereof and for drawing up plans for the prevention and combat against environmental

Appendix 1

degradation, environmental pollution and environmental incidents. Organizations and individuals shall have the responsibility to engage in the prevention and combat against environmental degradation, environmental pollution and environmental incidents.

Article 11

The State encourages, and shall create favorable conditions for all organizations and individuals in the rational use and exploitation of components of the environment, the application of advanced technology and clean technology, the exhaustive use of wastes, the economical use of raw materials and the utilization of renewable energy and biological products in scientific research, production and consumption.

Article 12

Organizations and individuals shall have the responsibility to protect all varieties and species of wild plants and animals, maintain biodiversity and protect forests, seas and all ecosystems.

The exploitation of biological resources must observe their prescribed seasonal characteristics and areas, using proper methods and permitted tools and means in order to ensure their restoration in terms of density, varieties and species, thus preventing ecological imbalance.

The exploitation of forests must comply strictly with plans and specific stipulations of the Law on Forest Protection and Development. The State shall adopt plans to involve organizations and individuals in afforestation and greening of wastelands and denuded hills and mountains to quickly expand the forest cover and protect catchment regions of watercourses.

Article 13

The use and exploitation of nature reserves and natural landscapes must be subject to permission by the sectoral management authority concerned and the State management agency for environmental protection and must be registered with the local People's Committees entrusted with the administrative management of these conservation sites.

Article 14

The exploitation of agricultural land, forestland, and land for aquaculture must comply with land use plans, land improvement plans and ensure ecological balance. The use of chemicals, chemical fertilizers, pesticides and other biological products must comply with stipulations by law.

In carrying out production and business activities or construction works, measures must be taken to restrict, prevent and combat soil erosion, land subsidence, landslide, soil salinization or sulfation, uncontrolled desalination, laterization and desertification of land, or its transformation into swamps.

Article 15

Organizations and individuals must protect water sources, water supply and drainage systems, vegetation, sanitation facilities, and observe the regulations on public hygiene in cities, urban areas, countryside, population centers, tourism centers and production areas.

Article 16

In carrying out production, business and other activities, all organizations and individuals must implement measures for environmental sanitation and have appropriate waste treatment equipment to ensure compliance with environmental standards and to prevent and combat environmental degradation, environmental pollution and environmental incidents.

The Government shall stipulate the nomenclature of environmental standards and delegate the authority at different levels for promulgating and supervising the implementation of such standards.

Article 17

Organizations and individuals in charge of the management of economic, scientific, technical, health, cultural, social, security and defense establishments that have begun operation prior to the promulgation of this law must submit an E.I.A. report on their respective establishments for appraisal by the State management agency for environmental protection.

In case of failure to meet environmental standards, the organizations or individuals concerned must take remedial measures within a given period of time as stipulated by the State management agency for environmental protection. Upon expiry of the stipulated time limit, if they still fail to meet the requirements of the State management agency for environmental protection, the latter shall report to the higher State authority at the next level to consider and decide on the suspension of operation or other penalizing measures.

Article 18

Organizations, individuals when constructing, renovating production areas, population centers or economic, scientific, technical, health, cultural, social, security and defense facilities; owners of foreign investment or joint venture projects, and owners of other socio-economic development projects, must submit E.I.A. reports to the State

management agency for environmental protection for appraisal.

The result of the appraisal of E.I.A. reports shall constitute one of the bases for competent authorities to approve the projects or authorize their implementation. The Government shall stipulate in detail the formats for the preparation and appraisal of E.I.A reports and shall issue specific regulations with regard to special security and defense establishments mentioned in Article 17 and in this article.

The National Assembly shall consider and make decision on projects with major environmental impacts. A schedule of such types of projects shall be determined by the Standing Committee of the National Assembly.

Article 19

The importation and exportation of technologies, machinery, equipment, biological or chemical products, toxic substances, radioactive materials, various species of animals, plants, gene sources and microorganisms relating to the protection of the environment must be subject to approval by the sectoral management agency concerned and the State management agency for environmental protection.

The Government shall stipulate a schedule for each domain and each category referred to in this Article.

Article 20

While searching, exploring, exploiting, transporting, processing, storing minerals and mineral products, including underground water, organizations and individuals must apply appropriate technology and implement environmental protection measures to ensure that environmental standards are met.

Article 21

While searching, exploring, exploiting, transporting, processing, storing oil and gas, organizations and individuals must apply appropriate technology, implement environmental protection measures, develop preventive plans against oil leakage, oil spills, oil fires and explosions and dispose necessary facilities to response timely to those incidents.

The use of toxic chemicals in the process of searching, exploration, exploitation, and processing of oil and gas must be guaranteed by technical certificates and be subject to the control and supervision by the State management agency for environmental protection.

Article 22

Organizations, individuals operating means of water, air, road and rail transports must observe environmental standards and be subject to the supervision and periodic inspection for compliance with environmental standards by the relevant sectoral management agency and the State management agency for environmental protection. The operation of transport means failing to meet stipulated environmental standards shall not be permitted.

Article 23

Organizations, individuals producing, transporting, trading, using, storing or disposing of toxic substances, inflammable or explosive substances, must comply with regulations on safety for human and other living beings and must avoid causing environmental degradation, pollution or incidents.

The Government shall stipulate a list of toxic, inflammable or explosive substances mentioned in this Article.

Article 24

The siting, design, construction and operation of plants in the nuclear industry, of nuclear reactors, facilities for nuclear research, for the production, transportation, utilization and storage of radioactive materials, for the disposal of radioactive wastes must comply with legal provisions on nuclear safety and radiation safety and with regulations by the State management agency for environmental protection.

Article 25

Organizations, individuals making use of machinery, equipment, materials with harmful electro-magnetic radiation or ionizing radiation must comply with legal provisions on radiation safety and must carry out regular check and environmental impact assessment of their facilities and report periodically to the State management agency for environmental protection.

Article 26

The choice of sites for collecting, dumping and treating refuse or pollutants and their transportation must comply with regulations by the State management agency for environmental protection and by the local authorities concerned.

Waste water, refuse containing toxic substances, pathogenetic agents, inflammable or explosive substances, non-degradable wastes, must be properly treated before discharge. The State management agency for environmental protection shall stipulate a schedule of wastewater and refuse mentioned in this Article and supervise their treatment process before discharge.

Article 27

The burial, lying in state, embalment, interring, cremation and transport of corpses or remains of the dead must utilize progressive methods and means and comply with provisions of the Law on Protection of Public Health to ensure environmental hygiene.

The Administration at all levels must plan for burial, cremation sites and guide people to gradually abandon backward practices.

Cemeteries, crematoria must be located far away from population areas and sources of water.

Article 28

Organizations, individuals in the course of their activities must not cause noises or vibrations that exceed permissible limits, harming the health of surrounding people and adversely affecting their life.

The People's Committees at all levels shall be responsible for the implementation of noise control measures in areas of hospitals, schools, public offices, and residential quarters.

The Government shall promulgate regulations to restrict, and to proceed towards the strict prohibition of the production and firing of firecrackers.

Article 29

The following activities are strictly prohibited:

1- Burning and destruction of forests, uncontrolled exploitation of minerals leading to environmental damage, destroying ecological balance;

2- Discharge of smoke, dust, noxious gas, bad odors causing harm to the atmosphere; emission of radiation, radioactivity exceeding permissible limits into the surrounding environment;

3- Discharge of grease or oil, toxic chemicals, radioactive substances exceeding permissible limits, wastes, dead animals or plants, harmful and infective bacteria and viruses into water sources;

4- Burial, discharge of toxic substances exceeding permissible limits into the soil;

5- Exploitation, trading in precious or rare species of plants and animals identified in the schedule stipulated by the Government;

6- Importation of technology and equipment not meeting environmental standards; importation, exportation of wastes;

7- Use of methods, means, instruments causing massive destruction in exploiting or harvesting animal and plant resources.

Chapter

**REMEDY OF ENVIRONMENTAL DEGRADATION, ENVIRONMENTAL POLLUTION,
ENVIRONMENTAL INCIDENTS**

Article 30

Organizations, individuals engaged in production, business and other activities that cause environmental degradation, environmental pollution, environmental incidents must implement remedial measures as specified by the local People's Committees and by the State management agency for environmental protection, and shall be liable for damages according to regulations by the law.

Article 31

Organizations, individuals allowing radioactivity, electro-magnetic radiation, ionizing radiation to exceed permissible limits must take immediate measures to control and remedy the consequences, timely report to the relevant sectoral management agency and to the State management agency for environmental protection, as well as to the local People's Committee to resolve the problem.

Article 32

The remedy of an environmental incident includes: eliminating the cause of the incident; rescuing people and property; assisting, stabilizing the life of the people; repairing damaged facilities; restoring production; sanitizing the environment, preventing and combating epidemics; investigating, collecting statistics on damages, monitoring changes to the environment; rehabilitating the environment of the affected area.

Article 33

Persons who detect signs of an environmental incident must immediately notify the local People's Committee, the nearest agency or organization for timely action.

Organizations, individuals at the site of the environmental incident must take appropriate measures to timely remedy it and immediately report to the superior administrative authority, the nearest People's Committee and the State management agency for environmental protection.

Article 34

The chairman of the People's Committee of the locality where the environmental incident occurs is empowered

to order an emergency mobilization of manpower, materials and other means for remedial actions.

If the environmental incident occurs in an area covering several localities, the Chairmen of the respective local People's Committees shall cooperate to take remedial actions.

In case the incident is beyond local remedy capability, the Minister of Science, Technology and Environment in conjunction with the heads of the agencies concerned shall determine the application of remedial measures and report to the Prime Minister.

Article 35

In case the environmental incident is of special severity, the Prime Minister shall determine the application of urgent remedial measures.

When such incident has been brought under control the Prime Minister shall determine the revocation of the application of the urgent remedial measures.

Article 36

The agencies which are empowered to mobilize manpower, materials, and other means to remedy environmental incidents must reimburse the mobilized organizations, individuals for their expenses according to regulations by the law.

Chapter IV STATE MANAGEMENT OF ENVIRONMENTAL PROTECTION

Article 37

The scope of State management of environmental protection includes:

- 1- Promulgating, and organizing the implementation of, statutory instruments on environmental protection; promulgating systems of environmental standards;
- 2- Developing, and guiding the implementation of, strategies and policies of environmental protection, plans to prevent, control and remedy environmental degradation, environmental pollution, environmental incidents;
- 3- Establishing and managing environmental protection facilities, and facilities relating to environmental protection;
- 4- Organizing, establishing and managing monitoring systems, periodically assessing the current state of the environment, forecasting environmental changes;
- 5- Appraising E.I.A. reports on projects and on production or business establishments;
- 6- Issuing, revoking certificates of compliance with environmental standards;
- 7- Supervising, inspecting, checking the observance of environmental protection legislation; settling disputes, appeals or complaints concerning environmental protection; dealing with breaches of environmental protection legislation;
- 8- Training personnel in environmental science and management; educating, propagandizing, disseminating knowledge and legislation in environmental protection;
- 9- Organizing research and development activities and application of scientific and technological advances in the field of environmental protection;
- 10- Developing international relations in the field of environmental protection.

Article 38

The Government shall, pursuant to its power and responsibility, exercise unified State management of environmental protection throughout the country.

The Ministry of Science, Technology and Environment shall be responsible to the Government for exercising the function of State management of environmental protection.

All ministries, ministry-level agencies and other Government bodies shall, within the scope of their respective functions, powers and responsibilities, cooperate with the Ministry of Science, Technology and Environment in carrying out environmental protection within their sectors and in establishments under their direct supervision.

The People's Committees of provinces and cities directly under the Central Government shall exercise their State management function for environmental protection at the local level.

The Services of Science, Technology and Environment shall be responsible to the People's Committees of provinces and cities directly under the Central Government, for environmental protection in their localities.

Article 39

The system of organization, functions, responsibilities and powers of the State management agency for environmental protection shall be determined by the Government.

Article 40

The State management agency for environmental protection shall carry out its function of specialized inspection on environmental protection and be responsible to coordinate with specialized inspectors of the ministries and sectors concerned in the protection of the environment.

The organization, obligations, powers, activities and coordination of specialized inspectors in the protection of the environment shall be determined by the Government.

Article 41

During the inspection process, the Inspection Team or Inspector is empowered to:

- 1- Require the organizations, individuals concerned to provide documents and reply to questions on matters necessary for inspection;
- 2- Conduct technical control measures on site;
- 3- Decide to temporarily suspend, in case of emergency, activities which threaten to cause serious environmental incidents and be responsible for such decision before the law, and at the same time, immediately report the case to the competent State agency for decision or recommend the latter to suspend activities likely to cause environmental incidents;
- 4- Deal within their competence or recommend the competent State agency to deal with breaches of the law.

Article 42

Organizations, individuals must create favorable conditions for the Inspection Team or the Inspector to carry out their functions and must observe the decisions of the Inspection Team or the Inspector.

Article 43

Organizations, individuals are entitled to appeal to the Head of the agency which decides the inspection against the conclusions and decisions adopted by the Inspection Team or the Inspector with regard to their establishments.

Organizations, individuals have the right to complain, denounce to the State management agency for environmental protection or other competent State agencies about activities in breach of environmental protection legislation.

Agencies receiving complaints, denunciations shall be responsible for their examination and resolution in accordance with regulations by the law.

Article 44

In case there are several organizations, individuals operating within an area where environmental incidents, environmental pollution or environmental degradation occur, the power to determine the responsibility assigned to those organizations, individuals for remedial measures is defined as follows.

1- For environmental incidents, environmental pollution or environmental degradation occurring within a province or a city directly under the Central Government, the responsible parties shall be determined by the specialized environmental protection inspector of that province, city, or proposed and reported by the latter to the Chairman of the People's Committee of that province or city for consideration and decision. If one or more parties disagree with that decision, they shall be entitled to appeal to the Minister of Science, Technology and Environment. The decision of the Minister of Science, Technology and Environment shall prevail.

2- For environmental incidents, environmental pollution or environmental degradation occurring in two or more provinces, or cities directly under the Central Government, the responsible parties shall be determined by the specialized environmental protection inspector of the Ministry of Science, Technology and Environment or proposed and reported by the latter to the Minister of Science, Technology and Environment for consideration and decision. If one or more parties disagree with the decision of the Minister of Science, Technology and Environment, they shall be entitled to appeal to the Prime Minister for decision.

Chapter V
INTERNATIONAL RELATIONS WITH RESPECT TO
ENVIRONMENTAL PROTECTION

Article 45

The Government of Vietnam shall implement all international treaties and conventions relating to the environment which it has signed or participated in, honor all international treaties and conventions on environmental protection on the basis of mutual respect for each other's independence, sovereignty, territorial integrity and interests.

Article 46

The Government of Vietnam adopts priority policies towards countries, international organizations, foreign organizations and individuals with respect to environmental manpower training, environmental scientific research, clean technology application, development and implementation of projects for environmental improvement, control of environmental incidents, environmental pollution, environmental degradation, and projects for wastes treatment, in Vietnam.

Article 47

Organizations, individuals and owners of transportation means which, in transit through the Vietnamese territory, carry potential sources of environmental incidents or environmental pollution must apply for permission, declare and

submit to the control and supervision by the State management agency for environmental protection of Vietnam. Any breach of Vietnamese environmental protection legislation shall, depending on the extent of the infringement be dealt with according to Vietnamese law.

Article 48

Any dispute concerning environmental protection on the Vietnamese territory in which one or all parties are foreigners shall be settled according to Vietnamese law, taking into account international laws and practices.

Any dispute between Vietnam and other countries in the field of environmental protection shall be settled on the basis of negotiation, taking into account international laws and practices.

**Chapter VI
REWARDS AND DEALING WITH BREACHES**

Article 49

Organizations, individuals having good records in environmental protection activities, in the early detection and timely report of signs of environmental incidents, in the remedy of environmental incidents, environmental pollution, environmental degradation, in the prevention of acts which damage the environment, shall be rewarded. Those who suffer damage to their property, health or life, while participating in the protection of the environment, in the remedy of environmental incidents, environmental pollution, environmental degradation and in the combat against activities violating environmental protection legislation, shall be compensated according to regulations by the law.

Article 50

Those who commit acts of destruction or cause damage to the environment, who disregard the order of mobilization by the competent State agency upon the occurrence of environmental incidents, who fail to implement regulations on environmental impact assessment, or infringe other legal provisions for environmental protection shall be dealt with administratively or be criminally prosecuted, depending on the nature and extent of the infringement and the consequences.

Article 51

Those who take advantage of their positions and powers to infringe environmental protection legislation, to protect persons infringing the environmental protection legislation, whose lack of responsibility allows environmental incidents or environmental pollution to occur, shall be disciplined or be criminally prosecuted, depending on the nature and extent of the infringement and the consequences.

Article 52

Organizations, individuals that commit acts of violation against the environmental protection legislation, causing damage to the State, to other organizations or individuals, shall, in addition to the penalties specified in Article 50 and 51 of this Law, compensate for the damages and costs of remedying the consequences, according to regulations by the law.

**Chapter VII
IMPLEMENTATION PROVISIONS**

Article 53

Domestic or foreign organizations, individuals that have caused serious damage to the environment prior to the promulgation of this Law, with long-term adverse impacts on the environment and the health of the people shall, depending on the extent of the consequences, be liable for the damages and the rehabilitation of the environment, according to regulations by the Government.

Article 54

This Law shall take effect from the date of its promulgation. All previous stipulations which contradict this Law are revoked.

Article 55

The Government shall regulate in detail the implementation of this Law.

This Law was passed on 27 December 1993 by the National Assembly of the Socialist Republic of Vietnam, 9th Legislature, at its 4th Session.

CHAIRMAN OF THE NATIONAL ASSEMBLY
Signed : Nong Duc Manh

Appendix 2
Government Decree on Providing Guidance for the
Implementation of the Law on Environmental Protection
(Government Decree No.175/CP)

GOVERNMENT
No.175/CP

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

Hanoi October 18 1994

GOVERNMENT DECREE
on providing Guidance for the Implementation
of the Law on Environmental Protection

THE GOVERNMENT

- Pursuant to the Law on Organization of the Government dated September 30,1992;
- Pursuant to the Law on Environmental Protection dated December 27,1993;
- On the proposal of the Minister of Science, Technology and Environment

DECREES:

CHAPTER

General provisions

Article 1:

This Decree shall make detailed stipulations for the implementation of Law on Environmental Protection passed by the National Assembly of the Socialist Republic of Vietnam on December 27, 1993 and announced by Decision No 29L/CTN dated January 10, 1994 of the President of State.

Article 2:

The Provisions of this Decree are applied to all activities of all Vietnamese organizations, individuals and all foreign organizations and individuals living and working on the territory of the Socialist Republic of Vietnam as prescribed in the Law on Environmental Protection.

Article 3:

Those provisions environmental protection relating to international relations have to be implemented in accordance with provision of Law on Environmental Protection with other relevant provisions of the Vietnamese Law and of the international treaties signed or participated by Vietnam.

In the case the provisions of the international treaties signed or participated by Vietnam are different from those of this decree, the provisions of those international treaties shall be applied.

CHAPTER

Distribution of Responsibility of State Management on Environment Protection;
Responsibility of Organizations and Individuals for Environment Protection

Article 4:

1. The Ministry of Science, Technology and Environment undertakes the integrated State management on environmental protection on a nation-wide scale and bears responsibility to organize and direct activities of environmental protection within its functions and duties such as:

- a) To work out and present to the Government to promulgate in accordance with its authority the legal documents on environmental protection;
- b) To work out strategies and policies of environmental protection and present them to the Government for promulgation;
- c) To preside over the drafting process, to present documents to the Government for decision and to coordinate in organizing implementation of long-term and yearly plans on preventing, resisting and overcoming environmental deterioration, pollution, incidents and on the projects of environmental protection and projects relating to environmental protection.
- d) To organize, construct and manage a general system of experimental observation of the environment;
- e) To assess the environmental status quo of the whole country and to periodically report to the Government and the National Assembly on its findings;
- f) To appraise the reports on assessment on environmental effects of the projects and local units as prescribed in Chapter of this Decree;
- g) To conduct research work and provide guidance for the application of scientific and technological advances in the field of environmental protection; to organize the formation and application of a system of environmental standard; to issue, withdraw certificates acknowledging environmental standards to organize training courses for environmental scientists and cadres of environmental management and protection;
- h) To provide guidance and to inspect other branches, localities, organizations and individuals in the

implementation of the law on environmental protection; to organize environmental inspection; to handle complaints and charges relating to environmental protection within its scope of authority;

i) To present to the Government all proposals on the participation of international organizations, the signing or participating of international treaties on environmental protection, to carry out activities relating to environmental protection.

2. The Environmental Department bears responsibility for assisting the Minister of Science, Technology and Environment to perform the function of state management of environmental protection on a nation-wide scale. The tasks, powers, and organization of the Environment Department shall be stipulated by the Minister of Science Technology and Environment.

Article 5:

1. The Ministries, Ministerial ranking bodies and offices belonging to the Government, according to their scope of responsibilities and in accordance with the provisions of laws on environmental protection, such as:

a) To draft and propose the Government to issue in accordance with its authority, the legal documents of environmental protection within their scope of responsibilities and in accordance with the provisions of the Law on Environmental Protection;

To work out their own strategies and policies of environmental protection in accordance with the general strategy and policy of environmental protection of the whole country;

b) To direct and inspect the implementation of the provisions of the law, the plans and measures of environmental protection in accordance with the guidance of the Ministry of Science, Technology and Environment within their own branches and the units under their own direct management;

c) To manage their own branches projects relating to environmental protection;

d) To coordinate in appraising the reports on assessment of environmental effects of the projects, the production, business units in accordance with the provisions in Chapter of this Decree;

e) To handle the disputes, claims and charges and to propose measures to deal with violations of environmental protection within the authority prescribed by the law.

2. The Ministries, Ministerial - ranking bodies, offices belonging to the Government coordinate with the Ministry of Science, Technology and Environment to conduct the following activities:

a) To investigate, observe, study and assess the current environmental situation within their own branches;

b) To draft and present proposals to the Government for decision and to organize the implementation of plans on preventing, resisting and overcoming environmental deterioration, pollution and incidents within their own branches;

c) To study and apply the scientific and technological advances in the field of environmental protection within their own branches;

d) To educate, propagandize and spread the knowledge, laws on environmental protection within their own branches.

Article 6:

1. The people's Committees of provinces and cities under Central Government bear responsibilities for the implementation of state management on environmental protection, such as:

a) To issue, in accordance with their authorities, legal documents of environmental protection in their localities;

b) To direct and inspect the implementation of the state and local regulations on environmental protection within their own localities;

c) To appraise the reports on assessment of environmental effects of the projects and local units as prescribed in Chapter of this Decree;

d) To issue and withdraw certificates acknowledging environmental standards of the production, business enterprises;

e) To coordinate with the Central offices in examining, inspecting and dealing with violations of laws on environmental protection in their own localities, to remind other organizations and individuals to realize the provisions of laws on environmental protection;

f) To receive and handle the disputes, complaints, charges and proposal on environmental protection in their own assigned powers or forward to the authoritative offices for settlement.

2. The provincial Department of Science, Technology and Environment are responsible before the People's Committees of the provinces and cities under Central Government for the implementation of state management environmental protection in their localities.

The tasks, powers and machinery organization of the provincial Department of Science, Technology and Environment are stipulated by the People's Committees of the provinces and cities under Central Government in accordance with the guidance of the Ministry of Science, Technology and Environment.

Article 7:

The state offices and mass association of people bear the following responsibilities in environmental protection:

Appendix 2

1. To assure strict implementation, within their offices and associations, of all the regulation of the law, of the Central offices and local authorities on environmental protection;
2. To propagandize and educate so as to raise the sense of responsibility of each member of the offices and associations on environmental protection;
3. Within their own scopes of responsibility and powers to inspect, educate or observe the implementation of the laws on environmental protection, to timely discover and report violations of laws on environmental protection to the authoritative offices for settlement.

Article 8:

All production and business organizations have to strictly comply with the provisions of laws on:

1. Assessing environmental impact; assuring the correct implementation of environmental standards; preventing, resisting and overcoming environmental deterioration, pollution and incidents;
2. Contributing finance to the cause of environmental protection and compensating for damages resulting from detrimental acts to the environment, as prescribed by the law;
3. Providing complete documents and creating favorable conditions for inspecting delegations or inspectors while they are conducting their missions; complying with the decisions of the inspecting delegations or inspectors;
4. Conducting propaganda and educational operations to raise the conscience of cadres and workers in environmental protection; periodically reporting to the offices in charge of state management of environmental protection in their localities on the current situation of environment in their operating areas.

CHAPTER

Assessment of environmental impact

Article 9:

The investors, project managers or directors of the offices and enterprises... belonging to the following areas have to conduct assessment of environmental impact:

1. The overall strategies for regional development, strategies and plans for development of provinces and cities under Central Government, strategies for urban and population development;
2. The economic, scientific, healthcare, cultural, social, security and defense projects;
3. Projects being carried out on the territory of Vietnam with the funds invested, assisted, granted or contributed by foreign organizations or individuals or international organizations;
4. The projects mentioned in items 1, 2 and 3 of this Article being approved before January 10, 1994 but not yet assessed environmental impact as required;
5. The economic, scientific, healthcare, cultural, security and defense units that have been operating before January 10, 1994.

Article 10:

1. The scope for assessing environmental impact includes:
 - a) To assess the current situation of the environment in the operating area of the project or unit;
 - b) To assess impact occurring to the environment as a result of the activities of the project or unit;
 - c) To present measures for environmental resolution.
2. All the contents mentioned in this Article are presented in a form of a separate report called Report of Assessment on Environmental Impact.

Article 11:

1. For the objects mentioned in items 1, 2, 3 and 4 of Article 9, the formation of reports of assessment on environmental impacts shall be conducted in two stages: Preliminary and Detailed (the objects exclusively mentioned in item 4 have to make detailed assessment only).

The contents of the report of preliminary assessment on environmental impact are stipulated in Appendix 1.

The contents of the report of detailed assessment on environmental impact are stipulated in Appendix 2.

2. For the objects mentioned in item 5 of Article 9, the contents of a report of assessment on environmental impact are stipulated in Appendix 3.

Article 12:

1. The methods used to assess environmental impact must be, by their nature, objective, scientific, practical and in accordance with the current international standards.

2. Reports of assessment on environmental impact must be made by offices and organizations with adequate professional expertise and facilities.

3. All organizations and units have to use Vietnamese environmental standards to prepare reports of assessment on environmental impact. Those fields whose environmental standards have not been set up, have to get agreement, in the form of documentation, from the offices in charge of state management on environmental protection.

Article 13:

A dossier for appraising a report of assessment on environmental impact includes:

1. For those objects mentioned in items 1, 2, 3, and 4 of Article 9:
 - a) A report of assessment on environmental impact;
 - b) Dossier of the project and related appendixes.
2. For those objects mentioned in items 5 of Article 9:
 - a) A report of assessment on environmental impact;
 - b) A report on the current situation of production and business operations and other relevant issues of the unit.
3. All documents in a dossier for appraisal are made in 3 copies. For the objects mentioned in item 3 of Article 9, the documents should be made in Vietnamese.

Article 14:

1. The work of appraising report of assessment on environmental impact by ongoing projects and operating units is separated into two levels:
 - a) The Ministry of Science, Technology and Environment shall appraise the Central level. In certain cases, the Ministry of Science, Technology and Environment can empower a specialized branch to conduct the appraisal;
 - b) The local level shall be appraised by the provincial Departments of Science, Technology and Environment. The division of appraising power is recorded in Appendix .
2. The Ministry of Science, Technology and Environment is responsible for presenting the Government a list of projects whose reports of assessment on environmental impacts should be introduced to the National Assembly for consideration.

Article 15:

1. The offices assigned with State management of environmental protection are responsible for appraising reports of assessment on environmental impact.
2. In case of necessity, an Appraising Council shall be set up.
 - a) The Ministry of Science, Technology and Environment shall decide the establishment of an Appraising Council at the Central level.
 - b) The chairmen of the People's Committees of the provinces and cities under Central Government will decide the establishment of Appraising Councils at the provincial level.
3. The composition of an Appraising Council includes scientist, managing officials, possibly the representatives of social organizations and ordinary people. The number of Council members cannot exceed 9.

Article 16:

The period of time for appraising a report of assessment on environmental impact cannot be longer than 2 months from the date all related documents are received.

For the objects mentioned in item 3 of Article 9 the period of time for appraisal must be in harmony with the period of time prescribed for issuing investment licenses.

Article 17:

Offices assigned with state management of environmental protection are responsible for the supervision of artistic design and conducting measures to protect the environment according to the suggestions of the Appraising Council.

Article 18:

In case they do not agree with the conclusions of the Appraising Council, the investors, project managers of directors of the enterprises, units etc. have a right to make complaints to the office which decided the establishment of the Appraising Council and to the upper-leveled office assigned with state management of environmental protection.

The complaints have to be considered and resolved in a maximum period of 3 months since the date the complaints are received.

Article 19:

For those objects mentioned in Article 9 of this Decree being controlled by the Ministries of Defense and Interior, the Ministers of Defense and Interior shall conduct the making and appraising reports of assessment on environmental impacts in accordance with the guidance of the Ministry of Science, Technology and Environment.

Article 20:

1. For the objects mention in item 5 Article 9 of this Decree, the making and appraising reports of assessment on environmental impact must be conducted step by step and within a fixed time according to the guidance of the Ministry of Science, Technology and Environment.

2. The results of the appraisals over reports of assessment on environmental impact of the operating enterprises

and units are classified into the 4 following categories for settlement:

- a) Being permitted to continue its operations without environmental penalty;
- b) Having to invest in building facilities to deal with the wasted materials;
- c) Having to change the technology, to move to other place;
- d) Having to suspend its operations.

CHAPTER **Preventing, Resisting and Overcoming Environmental** **Deterioration, Pollution and Incidents**

Article 21:

The utilization and exploitation of national gardens, natural preservation areas, areas of historical and cultural values relics, natural scenery etc... must be permitted by the management body of the concerned branch. Before issuing licenses, the management body of concerned branch has to obtain agreement (in writing) from the state management office for environmental protection.

After receiving documents permitting utilization and exploitation, the organizations or individuals whose names are recorded in the licenses, have to conduct registration procedures with the local authorities who directly control the above-mentioned preservation areas.

In a license, the following contents must be clearly recorded: The object and scope being granted for utilization, the purpose and duration of exploitation, the precautions and measures for environmental protection during exploitation.

Article 22:

Those organizations and individuals conducting operations relating to the environment have to comply with environmental standards.

The kinds of Vietnamese environmental standards includes:

1. Environmental standards for land protection;
2. Environmental standards for water protection;
3. Environmental standards for air protection;
4. Environmental standards to regulate noise pollution;
5. Environmental standards in the field of radiation and ionization;
6. Environmental standards for environmental protection in residential areas;
7. Environmental standards for environmental protection in production areas;
8. The standards for environmental assessment in the field of forestry protection;
9. The standards for environmental assessment in the field of protection of biological systems;
10. The standards for environmental assessment in the field of protection of ecological systems;
11. Environmental standards for protection of the sea and oceans;
12. Environmental standards for the protection of natural preservation areas and natural landscapes;
13. Environmental standards in the field of planning for industrial, urban and civil constructions;
14. Environmental standards concerning the transportation, storage and utilization of toxic and radioactive materials;
15. Environmental standards in the exploitation of surface and underground mines;
16. Environmental standards for motorized transportation;
17. Environmental standards for establishments using microorganisms;
18. Environmental standards for environmental protection of tourist areas;
19. Environmental standards in the field of export and import;
20. Environmental standards for hospitals and special illness treatment areas.

The Ministry of Science, Technology and Environment shall coordinate with the related ministries and branches in preparing and issuing standards on the above list.

Article 23:

All organizations and individuals when exporting or importing species of animals, vegetation (including seeds), microorganisms and gene sources must have permission from the management body of the concerned branch and the office for state management of environmental protection and must also obtain certificates of epidemic tests from an authoritative office for epidemic control in Vietnam. When these organizations and individuals discover that the objects defined in the licenses are likely to pose a danger by causing epidemic diseases to human being, cattle, poultry or by causing environmental pollution or deterioration, they have to urgently report to the nearest local authority and office for State management of environmental protection to enable immediate measures to deal with the problem by confinement or elimination, to be taken.

For precious and rare animals, and vegetation as defined in "Convention on International Trade of Endangered Species" (CITES) all organizations and individuals have to strictly comply with Law on Forestry Protection and Development and the Ordinance on Protection of Aquatic Resources. The list of sorts and species of those objects mentioned in this article are released by the Ministry of Forestry (Appendix), the Ministry of Fisheries, the

Ministry of Agriculture and Foodstuff Industry.

Article 24:

Any organizations and individuals wishing to export or import toxic chemicals and biological products have to obtain permission from the management body of the concerned industries and the State management body for environmental protection and also must strictly comply with current Vietnamese standard.

In applications, the exact purpose of the utilization, quantity, special technical characteristics, composition, formula (if available), commercial name, name of the company which produced it and the name of the country where it was produced must be made clear. These organizations and individuals have to export or import the exact types and amounts as defined in the licenses.

In case the above - mentioned materials and products' usefulness has expired, thus requiring disposal, their owners must reveal the amounts of waste, special technical characteristics and the disposal technology clearly, and the disposal process must be supervised by the body for state management of environmental protection and the empowered office of public security.

With chemicals of vegetation protection, they have to strictly comply with the Ordinance on Vegetation Protection and Epidemic Control.

Article 25:

The imports of complete equipment and technology as required by projects and joint ventures can only be conducted after economic technical justifications have been approved together with the appraisal conclusion on reports of assessment on environmental impacts of the projects made by the body for state management on environmental protection.

For the important separate equipment of environmental protection, when considering them necessary, the body for the state management on environmental protection shall consider and grant permission for importing.

The distribution of power to deferent levels to grant licenses for this kind of operation shall be as follows:

- The Ministry of Science, Technology and Environment shall issue import licenses to those projects and joint ventures approved by the State Council of Appraisal.

- The provincial Department of Science, Technology and Environment shall issue licenses for the remaining cases in accordance with the guidance of the Ministry of Science, Technology and Environment.

Article 26:

1. All transportation means operating on land, railway and water surface are not allowed to emit smoke, dust, oil, and gas containing toxins surpassing the defined standards in to the surrounding environment (Appendix). For the above-mentioned transportation means, if they are imported into Vietnam after the Law on Environmental Protection came into effects, they have to meet the requirements of waste standards before being operated.

2. For all engine-transportation means, when their owners operate them, they have to ensure that the noise level does not surpass the stipulated levels (Appendixes V1, V2, V3 and V4).

3. For the transportation means being granted permission to operate before the effective date of the Law on Environmental Protection, their owners have to apply technical alterations to minimize the amounts of smoke and toxic waste emitted into the environment. From April 1, 1995 all motorized transportation means operating in urban areas have to guarantee that the smoke levels emitted does not exceed 60 Hartridge units, they are not allowed to emit the above-mentioned substances causing environmental pollution, nor cause noise surpassing the permitted levels.

Any means of transportation failing to reach the above-mentioned standards shall be suspended from operation.

4. The owners of engine-transportation means if passing hospitals, sanatoria, schools and densely populated residential areas at rest time (noon) and after 22.00 hours are not allowed to use horns.

The Ministry of Transportation and Communications is responsible for organizing the examination and issue of licenses for transportation means, acknowledging their satisfaction of environmental standards.

Article 27:

1. All production and business establishments, hospitals, hotels, restaurants etc. ... having the discharged substances in forms of solid, liquid and gas have to organize the treatment so as to reach environmental standards before discharging out of the management scope of their establishments; the technologies for treatment of the above-mentioned discharged substances have to be approved by the authoritative body of state management.

2. Everyday, discharged substances in urban and industrial areas have to be collected, transported and treated in accordance with regulations on management of discharged substances.

3. Discharged substances containing micro-organisms and disease-causing viruses have to be carefully treated before being discharged into public dumping grounds in accordance with current regulations.

4. Discharged substances containing toxic chemicals which are hard to dissolve have to be treated by a separate technology instead of being discharged into the areas for daily life discharged substances.

Article 28:

1. The import and export of discharged substances containing toxic elements or pathogenic microbes possibly causing environmental pollution are prohibited.

2. The Ministry of Science, Technology and Environment shall provide guidance for all branches and localities to make the lists of secondary and wasted materials which satisfy the standards of environmental hygiene and therefore are allowed to import as production materials so as to present them to Prime Minister of the Government for decision.

Article 29:

From January 1st 1995, the production, transportation, trading, storage and use of all kinds of crackers are prohibited on the whole territory of Vietnam.

The Government shall make stipulations about production and use of fireworks on some special holidays and festivals.

Article 30:

1. The Ministry of Science, Technology and Environment shall submit to the Prime Minister of the Government the specially serious cases of environmental incidents and propose the urgent measures of treatment for the Prime Minister to decide.

2. The specially serious cases of environmental incidents are those causing immense and serious damages to:

- a) Lives and properties of several people.
- b) Economic, social, security and national defense establishments.
- c) Widespread area of many provinces' and cities' territory.
- d) Area of international influence.

3. The Ministers of National Defense and the Interior will organize a specialized force to act as a key instrument in coping with environmental problems.

The Ministry of Science, Technology and Environment working together with the Ministries of National Defense and Interior and related ministries and branches will work out the plan to form this force and submit the plan to the Prime Minister of the Government for his / her decision.

Article 31:

The payment of costs in overcoming environmental incidents for organizations and individuals that are mobilized shall be conducted on the principle of agreement between the mobilized organizations, individuals and with the authority to mobilize.

The Ministry of Finance shall make detailed stipulations for this kind of payment.

CHAPTER V

The Financial Sources for the Task Environment Protection

Article 32:

The financial sources for the task of environment protection include:

1. The State budget allocation for activities of environmental protection, for the tasks of scientific research and state management on environmental protection;

2. Fees of appraisals over assessment reports on the environmental impacts of socio-economic projects; fees of environmental protection contributed in accordance with the detailed stipulations of the Ministry of Finance by organizations and individuals who utilize environmental components for the purposes of production and business.

3. Other sources (such as fines charged on administrative violations, funds contributed by any socio-economic organizations).

Article 33:

The Government shall establish a National Reserve Fund for dealing with environmental deterioration, pollution and incidents. This Fund will be used to cope with emergency cases of environmental incidents, pollution and deterioration.

The financial sources for the above-mentioned Fund includes money extracted from the State Budgets, contributions from different enterprises (including joint-ventures with foreigners), contributions by organizations and individuals in and outside of Vietnam, to activities of environmental protection in Vietnam.

The Ministry of Science, Technology and Environment and the Ministry of Finance will work out management regulations and use of this Fund.

Article 34:

All organizations and individuals who conduct production and business operations in the following fields or with the following objects have to pay fees for environmental protection:

- Exploiting oil, gas or other mineral resources;
- Airports, seaports, bus stations, railway stations;
- Motorized transportation;
- Other fields of production and business causing environmental pollution.

Foreign organizations and individuals conducting production and business operations which cause

environmental pollution have to pay environmental protection fees.

The fee level depends on the harmful level possibly caused to the environment by production and business operations.

The Ministry of Science, Technology and Environment and the Ministry of Finance shall provide detailed guidance on collection and use of environmental protection fees.

Article 35:

The financial sources for the task of environmental protection shall be spent annually on the following activities:

1. Basic surveys on environmental elements, especially of land, water, air, forest, sea and related cultural sites...
2. Surveys on situations of environmental pollution in big provinces and cities, industrial areas, condense residential areas, water areas of ongoing oil exploitations...
3. Measures of environmental protection, restoration and improvement and of management of discharged substances (especially toxic ones) in cities and industrial areas;
4. Projects of preservation and restoration of ecological systems having important meaning to the sustainable socio-economic development and biological diversification (including national gardens, protected natural reserves, the ecological systems of submerged land in river estuaries and coast lines, the ecological systems of salt marsh forests, submerged coral reefs, rare and precious species of creatures, protection of gene resources ...)
5. Basic construction of necessary facilities for environmental protection.

Article 36:

The Ministry of Science, Technology and Environment and the Ministry of Finance shall make stipulations on the collection, payment and management of finance and properties in operations of environmental protection in accordance with the existing regime of management.

**CHAPTER
Inspection of Environmental Protection**

Article 37:

The Ministry of Science, Technology and Environment bears responsibility before the Government to organize and conduct the implementation of professional inspection on environment protection, with the following duties:

1. To inspect the activities of environmental protection of all ministries and branches and the performance of state management in environmental protection of the People's Committees of different levels in their localities.
2. To inspect the compliance with provisions of the laws on environmental protection: Standards, regulations on preventing, resisting and overcoming environmental deterioration, pollution and incidents when utilizing and exploiting environmental components by organizations and individuals.

Article 38:

The organization, power and scope of activities of professional inspection on environmental protection will be unanimously stipulated by the Minister of Science, Technology and Environment and the State's General Inspector in accordance with provisions of the Law on Environmental Protection and the Ordinance on Inspection.

**CHAPTER
Provisions for Implementation**

Article 39:

This Decree shall come into effect from the signing date. All previously issued regulations which are contrary to this Decree shall be hereby repealed.

Article 40:

All Ministries, Heads of Ministerial ranking bodies, Heads of Offices belonging to the Government; Chair people of People's Committees of provinces and cities under Central authorities are responsible for providing detailed guidance, according to their functions and powers, for the implementation of this Decree.

**On behalf of Government
The prime Minister
Signed VO VAN KIET**

Appendix .1
THE CONTENTS OF THE REPORT FOR THE PRELIMINARY
ENVIRONMENTAL IMPACT ASSESSMENT

. INTRODUCTION

1. Objective of the Report
2. Document, Data Base of the report
3. Brief project description

. DATA OF THE ENVIRONMENTAL SITUATION

Qualitative, quantitative assessment, in the case where there is no quantitative data then classing according to degree: Heavy, medium, light, unknown by each natural factor (water, soil, air...)

. ENVIRONMENTAL IMPACT ASSESSMENT DURING PROJECT IMPLEMENTATION

General assessment according to the main factors:

1. Air
2. Water
3. Noise
4. Soil
5. Ecosystem
6. Solid waste
7. Historical landscape
8. Infrastructure
9. Transportation
10. Community Health's
11. Other factors.

. CONCLUSIONS AND RECOMMENDATIONS

1. Conclusion on the Environmental Impact of the project.
2. Recommendation to the problems that need to have detail assessment.

Appendix .2
THE CONTENT FOR DETAILED ENVIRONMENT;
IMPACT ASSESSMENT REPORT

. INTRODUCTION

1. Objective of the Report
2. Document, Data Status of the Report
3. Selection of the Assessment Method
4. Organization, members, method and the process used in preparing report

. BRIEF DESCRIPTION OF THE REPORT

1. Name of the project
2. Name of the Holder, the agency implements the setting up feasibility study or documents equivalent to the project value.
3. Socio-economic objective, the political significant of the project.
4. The main contents of the project. The socio-economic benefit that project can provide.
5. Project progress, plan for project exploitation.
6. Project cost, cost process.

. ENVIRONMENTAL STATUS AT THE PROJECT LOCATION

1. General description of the geographical, socio-economic conditions related to the project location.
2. Forecast of the conditions if the project is not implemented.

. IMPACT OF THE PROJECT IMPLEMENTATION TO THE ENVIRONMENTAL AND NATURAL RESOURCES FACTORS

1. Description of the Impact to the project implementation to each Environmental factor at the project locations. Presenting the characteristics, degrees, and occurrences at each time of the impact. Compare to the circumstance of not implementing project.

A. Impact of the physical environmental forms water quality, air quality

B. Impact to the Biological resources and ecosystems

1. Aquatic ecosystem
2. Terrestrial ecosystem

C. Impact to the Natural Resource and Environment

1. Water supply
2. Transportation

3. Agriculture
4. Irrigation
5. Energy
6. Exploration
7. Industry
8. Small Industry
9. Land use to other objections
10. Creation, Health protection

D. Impact to the direct condition that impact to the people living quality

1. Socio-economic condition
2. Cultural condition
3. Aesthetic

2. General environmental assessment in the case of the project implementation.

Analysis of the synthetic Environmental development for each alternative for project implementation.

The damages to natural resources and environment resulting from each alternative. The measures overcoming.

In this part, it needs to avail.

- The material inputs to production
- The waste of the production
- The products
- Impact forecast of these materials to environment

3. The mitigating measles to limit negates impact of the project on the environment.

Presenting in s detailed manner the technical measures, technology, management for overcoming the negative impact on the environment of the project.

Comparing the resulting benefits and the costs for each alternative of the project.

4. General assessment.

General assessment of the degree of condenses of the forecast of the environmental impact assessment. The study, investigation, survey that would be required for more confident conclusion and further adjust of the forecast of the environmental impact assessment in the future.

. RECOMMENDATIONS ON THE ALTERNATIVE FOR PROJECT IMPLEMENTATION

1. Recommendation for alternative selection to implement the project base on the environmental point of view.

2. Recommendation for the Environmental protection measures associated with the approved alternative.

Appendix .3

**THE CONTENT OF THE ENVIRONMENTAL
IMPACT ASSESSMENT REPORT TO THE OPERATING UNITS**

. INTRODUCTION

1. Objective of the Report
2. Document data of the report
3. Brief summary of the operation, capacity, material, product, insurance and worker's salary.

. BRIEF ON THE OPERATING UNIT, TECHNOLOGY AND EFFICIENCY OF THE UNIT ETC.

. BRIEF DESCRIPTION OF THE ENVIRONMENTAL STATUS AT THE LOCATION

- Biological factors: inland and water ecosystems
- In-Physical factors: water, soil, air...
- Infrastructure: water supply and drainage transportation, Irrigation
- Socio-economic conditions and community health

. IMPACT ASSESSMENT TO THE UNIT'S ENVIRONMENT

- Criteria for assessment
 1. Air
 2. Water
 3. Noise
 4. Soil
 5. Ecosystem
 6. Waste
 7. Landscape, Historical relies
 8. Infrastructure
 9. Transportation
 10. Community health
 11. Others

For each of the above criteria, it needs to determine in qualitative quantitative manner (compared with the

standard in the case there isn't the quantitative data then classify according to the degrees: Heavy, medium, light, unknown etc...

General assessment of the environmental damages: The gain and loss of the socio-economy.

. ENVIRONMENTAL SETTLEMENT ALTERNATIVE

Dictate the technological alternative and processed technology, cost requirement and the implementation.

. CONCLUSION AND RECOMMENDATION

- Main conclusions

- Recommendation on the alternatives and measures for reducing the impact caused to the operating unit.

**Appendix
APPRAISAL DECENTRALIZATION OF EIA - REPORT**

	Operating projects and enterprises	MOSTE	DOSTE
1	Mining	Big and medium mine	Small
2	Oil exploring and refinery, oil chemicals and gas	All	
3	Chemical plant	All	
4	Steel plant	All	
5	Non-ferrous metal plant	All	
6	Leather plant	Over 1000 T/year	Rest
7	Textile plant	Over 30 mil m/year	Rest
8	Plant protection chemical plant	All	
9	Rubber and paint plant	All	
10	Plastic plant	Over 1000 T/year	Rest
11	Radiation plant	All	
12	Airport	All	
13	Export processing zone	All	
14	Hydropower dam, water reservoir	Over 100 mil m ³ /year	Rest
15	Irrigation system	Above limitation	
16	Thermal and other kinds of power plants	Over 30 MW	Rest
17	Cement plant	Over 500,000 T/year	Rest
18	Paper and paper pulp mill	Over 40,000 T/year	Rest
19	Pharmaceutical plant	Cities under Central Government	Rest
20	Fertilizer plant	Over 100,000 T/year	Rest
21	Food processing factory	Over 1,000 T/year	Rest
22	Sugar plant	Over 100,000 T/year	Rest
23	Hospital	Over 500 beds	Rest
24	Railway, Motorway of grades 1, 2, 3	Over 50 kms	Rest
25	Power transmission station	Over 110 kV	Rest
26	Tourism and entertainment resort	Over 100 ha	Rest
27	Oil and gasoline store	Over 3,000 m ³	Rest
28	Poisonous chemicals store	All	
29	Plantation	Over 2,000 ha	Rest
30	Wood exploiting farm	Over 3,000 ha	Rest
31	Industrial forestation farm	Over 2,000 ha	Rest
32	Aquacultural farm	Over 200 ha	Rest
33	Port	Over 100,000T/year	Rest
34	Ply-wood factory	Over 500,000 m ² /year	Rest
35	Migration area	Over 500 households	Rest
36	Alluvial plain	Over 500 ha	Rest
37	Engineering factory	Over 50,000 T/year	Rest
38	Telecommunication stations	Rader station and central broadcasting station	Rest
39	Freezing plant	Large and medium scale	Small
40	Construction materials factory	Large and medium scale	Small
41	Hotel and business sector	Large and medium scale	Small

Appendix (omitted)
LIST OF PRECIOUS FOREST PLANTS AND ANIMALS

Appendix IV (omitted)
EMISSION STANDARD FOR ALL VEHICLES
EMISSION STANDARD FOR NEW VEHICLE

Appendix .1 (omitted)
PERMITTED VIBRATION

Appendix .2 (omitted)
VIBRATION IN EACH OCTA

Appendix .3 (omitted)
NOISE STANDARD FOR VEHICLE

Appendix .4
NOISE STANDARD IN AREAS (UNIT DBA)

Areas	6 a.m. to 6 p.m.	6 p.m. to 10 p.m.	10 p.m. to 6 a.m.
Category	55	50	45
Category	65	60	50
Category	70	65	55
Category	75	70	60
Category	80	75	65

Note :

Category : Areas that need quietness such as hospitals, kindergartens, schools, libraries, research institutes.

Category : Residential areas, hotels, offices.

Category : Business areas, surrounding areas 15 meters from the main traffic roads, markets, stations and bus stop.

Category : Handicraft and light industry manufacturing area.

Category : Heavy industry manufacturing area case noise (background noise) in the area when the vehicle does not operate, higher than the standard mentioned in the table above, the vehicle should not make the noise increase more than 5DBA from the original noise level.

Appendix 3
Regulation on Hazardous Waste Management
(Decision No.155/1999/QD-TTg)

REGULATION ON HAZARDOUS WASTE MANAGEMENT

(Promulgated by Decision No. 155/1999/QĐ-TTg dated 16 July 1999 by the Prime Minister.)

CHAPTER 1 GENERAL PROVISIONS

Article 1

This Regulation stipulates the management of Hazardous Wastes (hereafter written as HW) to prevent and minimize their harmful impacts to the environment and human health.

Article 2

This Regulation is applied to the individuals, organizations operating within Vietnamese territory relating to generation, collection, transportation, transit, storage, treatment or disposal of HW.

This Regulation also is applied to foreign individuals, organizations operating within the Vietnamese territory relating to generation, collection, transportation, storage, treating and disposal of HW, unless otherwise stipulated by International Treaties to which the State of Socialist Republic of Vietnam is a Contracting Party.

Article 3

In this Regulation the terminology used is understood as follows:

1. Waste: as defined under Item 2, Article 2 of the 1993 Law on Environmental Protection.
2. Hazardous Waste is waste, which contains substances or compounds having one of the direct hazardous characteristics (flammable, explosive, poisonous, corrosive, infectious or other hazardous characteristics) or causes hazards to the environment and human health when contacting other substances. The HW List is defined in Annex 1 of this Regulation. HW List is to be stipulated by the Agency in charge of State Management of Environmental Protection at the central level.
3. Hazardous Waste Management is the activity aimed at controlling HW in all processes from their generation to collection, transportation, transit, storage, treatment, and disposal of them.
4. Agency in charge of State Management of Environment Protection (hereafter written as SMEP) means: at central level is the Ministry of Science, Technology and Environment; at local level is the People's Committee of the provinces and cities directly under Central Government.
5. HW Generator is the individual or the organization that owns or operates the facility generating HW.
6. HW Collector and Transporter are individuals or organizations that is licensed to implement collection and transportation of the HW.
7. HW Storage Owner is the individual or organization that is licensed to store HW.
8. HW Disposer is the individual or organization that is licensed to implement treatment and disposal of HW.
9. Collection of HW includes collection, classification, packaging and temporary storage at legally accepted sites.
10. Storage of HW is the action of keeping HW for a certain period of time, and under necessary conditions to ensure that there is no leakage or release to the environment until the HW to be transported to the legally accepted sites for treatment or disposal.
11. Transportation of HW is the process of transporting the HW from the generation source to the storage, treatment and disposal sites.
12. HW treatment is the process using technologies or technical methods (including the collection, recycling, re-use, incineration of waste) aimed to change the characteristics and the composition of the HW in order to eliminating or minimizing hazards to the environment and human health.
13. Disposal of HW is the process using the technology to isolate (includes landfilling) HW, eliminating possibilities of causing hazards to the environment and human health.
14. Registration documentation referred to issued by the Agency in charge of State Management of Environment Protection to the HW producer, collector and transporter.
15. License to store, treat and disposal of HW (here after referred to as license) is the document issued by the Agency in charge of State Management of Environment Protection providing the details of requirements, responsibilities and conditions to carry out that activity.
16. Accepted site or factories are the place, where the HW can be stored and, treated and disposed of, approved by the Agency in charge of State Management of Environment Protection.
17. HW manifest document is the document that accompanies the HW from the generation source, during transport to the site where it is stored, treated or disposed off.

Article 4

HW produced from activities relating to the oil, gas, medical, activities using radioactive substances, flammable, or explosive substances, must comply with the provision of this regulation and also comply specific regulations about these activities.

Article 5

Disputes among parties where one party is a foreign individual or organization in understanding and applying this regulation is settled according to Vietnamese Law. In the event that, the international Treaties that Vietnam participates or signs provide other stipulations different from this regulation the provision of the treaty will apply.

Article 6

1. HW generator must register their activities with the Agency in charge of State Management of Environment Protection to obtain a registration number.
2. HW collector, transporter, storage owner and disposer must apply for a license to operate. Operating sites, facilities, mean for collection, storage, treatment and disposal of HW regulated by the Agency in charge of State Management of Environment Protection.

Article 7

HW generator, collector, storage owner and disposer must periodically report on HWM (Attached Annex 4) to the Agency in charge of State Management of Environment Protection, keeping files and diary of HWM at the site (Attached Annex 5), and to be inspected by the Agency in charge of State Management of Environment Protection.

Article 8

Procedures for granting of HWM registration document, license to store, treat and dispose HW are as follows:

1. HW generator must apply for the registration number for HWM at the Agency in charge of State Management of Environment Protection either at central or local level (Attached Annex 2A).
2. Within 45 days from the date of receiving the complete and legal application form, the Agency in charge of State Management of Environment Protection must process the document and issue the HWM registration number. In the event of refusal, the agency must reply to the applicant by writing and clearly note the reason why.
3. The collector, transporter, storage owner, disposer of HW must apply for license at the Agency in charge of State Management of Environment Protection at central or local level (Attached Annex 2B).
4. Within 45 days from the date of receiving the completed license application form, the Agency in charge of State Management of Environment Protection will process the document and issue the license. In the event of refusal, the agency must inform the applicant by writing and clearly note the reason why.

Chapter 2**Management of Hazardous Waste Generation****Article 9**

The responsibilities of the HW generator at the facility or at the site are:

1. To minimize and classify the HW from source.
2. Package the HW according to its type with suitable packaging that meets safety and technical requirements, clearly labeled according to Competent State authorities requirements.
3. Safely store the HW on site before handing it over to the collector, transporter, storage owner, and disposer of HW, ensure that:
 - a) The storage area is fenced, labeled and meets the requirements of the Agency in charge of State Management of Environment Protection for HWM.
 - b) Separate from non-hazardous wastes (both liquid or solid), and separate from other HW.
 - c) Effective plan for prevention of any problems and ensure safe storage in an area.

Article 10

The HW generator must comply with the followings:

1. Sign the contract with the collector, transporter, and disposer when being incompetent to undertake those activities at site.
2. Only hand over HW to licensed collector, storage owner, transporter and disposer.
3. Complete and sign the first part of the manifest document (Attached Annex 3). The HW manifest document includes 5 copies. The HW producer keeps 1 copy, the rest are passed to the collector and transporter.
4. Check to ensure the HW was collected and transported to the assigned place as stated in the contract.
5. Explain to and provide information the competent state authorities as required.
6. In the event that the HW generator collects, transports, stores, treats and disposes the HWs themselves, they also

have to register and apply for license complying with all the requirements stated in Chapter 3 and 4 of this regulation.

Chapter 3 **Responsibility of the HW Collector and Transporter**

Article 11

The collector and transporter must have the technically adequate facility to ensure the technical safety requirements as follows:

1. Mechanical and chemical stability while operating.
2. Does not cause leakage, release into the environment, does not mix different HW, not made of materials that are easy to react with HW.
3. Has an alarm facility, and equipment for emergency response.
4. Has relevant warning labels.

Article 12

Responsibilities of the Collector and Transporter of HW

1. Collect and transport the amount and type of HW as noted on the accompanying HW manifest documentation.
2. Complete the procedures relating to the HW manifest document, complete and sign Part of the HW manifest document; require the storage owner, and disposer to sign Part of the HW manifest document. The Collector, transporter keeps one copy and the remaining 3 copies are handed over to the storage owner, and the disposer.
3. Hand over HW to the storage owner, and disposer as stated on the HW manifest document.
4. Report to the Agency in charge of State Management of Environment Protection according to the form and due-date stated on HWM registration document (Attached Annex 4).

Article 13

In the event of any problems arising, the collector and transporter have the responsibility:

1. To carry out emergency measures in order to reduce damage to the environment and human health.
2. To immediately inform the local Agency in charge of State Management of Environment Protection to coordinate for the treatment and also provide full, accurate and required information in time to the Agency in charge of State Management of Environment Protection and the local People's Committee, and carry out their instructions to overcome the problem.
3. Quickly overcome the problem caused by HW and be responsible for paying compensation for damages to health, property, and environment as specified under the law.
4. In the event that the HW must be transported out of the problem area, the transporter must obtain the approval from the local Agency in charge of State Management of Environment Protection.

Article 14

Transporting the HW across borders must comply with the regulations of the "Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal" (the Basel Convention 1989) as follows:

1. HW transited through VN territory including internal waters and territorial waters must obtain written approval from the central Agency in charge of State Management of Environment Protection, and to be controlled, supervised by the relevant offices in accordance with Vietnamese Law on transit of goods. Transporting HW through exclusive economic zones of Vietnam must have prior consent to the Vietnamese central Agency in charge of State Management of Environment Protection.
2. The individual or organization who want to transit HW through Vietnamese territory, must apply for approval from the central Agency in charge of State Management of Environment Protection. The application form must have the following details:
 - a) The departure and destination of the HW
 - b) Scheduled date, time of transit of HW through VN territory.
Quantity, type of HW or other waste to be transited.
 - c) Certificate of the import country stating that the import of this quantity and type of HW does not violate the law or any international conventions that the country participates or signs.
 - d) All the information relating to the exporter, transporter, disposer as well as their approved facilities for operation.
 - e) All the information relating to the procedure to implement emergency response to incidents during transit.
 - f) Insurance and other information.
 - g) Within 60 days of receiving the application, the Agency in charge of State Management of Environment Protection will reply to accept the transit or not.

3. In the event of obtaining approval, the individual or organization transiting HW must follow the following regulations:
 - Package the HW in suitable containers and label according to international standards.
 - Guarantee that the HW will not be leaked at the borders and during transit.
4. Any action of transiting HW that does not follow the above regulations or does not comply with the license, is considered illegal action and will be punished according to Vietnamese Law.
5. In case of leakage or release of HW, the individual or organization must immediately inform the Agency in charge of State Management of Environment Protection and must carry out all the requirements as stated in **Article 16**.

Chapter 4

Responsibilities of the HW Storage Owner and Disposer

Article 15

The Storage owner, and disposer of HW has the following responsibilities:

1. Develop an environmental impact assessment report and submit to the Agency in charge of State Management of Environment Protection for approval. Use the means, storage equipment, treatment equipment and disposal of HW as the requirements state in the license issued by the Agency in charge of State Management of Environment Protection.
2. Receive HW from the generator, collector, transporter according to the contract signed between the two parties, with attached complete HW manifest document.
3. Have a plan and adequate facilities to meet the requirements of prevention and emergency response.
4. Complete the HW manifest document and send back one copy to the generator, one to the collector and one to the transporter.
5. Report to the Agency in charge of State Management of Environment Protection on the information relating to HWM (Attached Annex 4).
6. Train technical staff to meet the requirements of storage, treatment and disposal of HW.

Article 16

The HW Disposer must undergo the followings:

1. Do not landfill the HW with non HW;
2. Only landfill HW at the specified site;
3. The HW landfilling area must meet the environmental requirements and technical requirements guided and stipulated by the Agency in charge of State Management of Environment Protection;
4. Do not overload the capacity of the HW landfilling area;
5. Do not discharge HW into the environment, including air, land, water.

Article 17

During HW treatment and disposal process, the disposer must follow all requirements specified in the environmental impact assessment report. Air emission, wastewater, sludge, ash must be monitored and their composition must be analyzed and results recorded in a diary for monitoring and treatment so as to comply with Vietnamese Standards (hereinafter called TCVN). In the event of not complying with TCVN, the disposer must:

1. Have measures to upgrade the air treatment, wastewater, sludge, ash system within the permitted period by the Agency in charge of State Management of Environment Protection.
2. Landfill the treated waste (that is not TCVN compliant) at the stipulated site.
3. The Collector, Transporter, Storage owner, and Disposer are not allowed to dilute HW or mix the HW with non HW.

Article 18

In the event of incidents occur, the Storage Owner and the Disposer must:

1. Carry out emergency measures to minimize damage to the environment and human health.
2. Immediately inform the local Agency in charge of State Management of Environment Protection and local provincial People's Committee to instruct and coordinate the action; at the same time providing sufficient and accurate data on the incident to local Agency in charge of State Management of Environment Protection and provincial People's Committee where incident occurs and follow their instruction for response to incident.
3. Immediately response to incident caused by HW. Pay compensation for damage to health, property and environment according to the Law in the event of letting incident cause damage to the environment, human property and health.
4. In the event that the HW must be transported out of the incident area, they must obtain the prior approval from the

local Agency in charge of State Management of Environment Protection.

Article 19

In the event of closing the storage, treatment and disposal of HW facilities, the Collector and the Disposer has the responsibility to:

1. Immediately inform the central and local Agency in charge of State Management of Environment Protection and the local provincial People's Committee of the reasons the proposed time of terminating operation;
2. Submit the Environmental Protection Plan for after-closing period of the facility, to the Agency in charge of State Management of Environment Protection and the local provincial People's Committee. Content of the plan should include the following:
 - a) The technological measures to treat environmental pollution.
 - b) Methods to rehabilitation and utilize land after closing operation.
 - c) The requirement and monitoring measures after closure.
3. Deal with all other arising consequences.
4. The Agency in charge of State Management of Environment Protection at central or local level within their authorities must assess and advise the People's Committee of Cities and Provinces in making the decision to cease the operation of HW storage, treatment or disposal facility.

Article 20

For any existing polluted area, the local authority has the responsibility to act according to their competence, if it goes beyond their ability, they should submit to the Agency in charge of State Management of Environment Protection and relevant bodies to coordinate solutions.

The existing polluted area relating to security and national defense will be settled by the Ministry of Defense and Ministry of Interior according to their authorities, if it goes beyond their competence, they should report to the Agency in charge of State Management of Environment Protection and relevant bodies to coordinate solutions.

Chapter 5
State Management of HW

Article 21

The responsibilities of the Ministry of Science, Technology and Environment:

1. Undertake the state management on HW throughout the country and to organize and instruct implementation of HW management.
2. Develop and promulgate or submit for promulgation to the Government other necessary legal document relating to HWM.
3. Grant registration number and environmental licenses to the generator, collector, storage owner, and disposer of HW (attached Annex 2A, 2B)
4. Promulgate environmental requirements for the selection of HW landfill, promulgate the technical and environmental requirements for design, construction and operation of storage and landfill site which ensures environmental hygiene; select and advise on technology for HW treatment; coordinate with Ministry of Finance to set up regulation on fees of HWM.
5. Instruct the development of and assess the environmental impact assessment report for the collection, storage, disposal and landfill facilities for HW.
6. Research and apply new technology in HWM.
7. Investigate and evaluate the environmental pollution level at the HW collection, storage, disposal site; implement periodically check and irregular inspection of HWM activities.
8. Implement training and awareness raising of HWM:
 - a) Being the host, coordinate with relevant Ministries and Branches and the local level to teach the HWM regulation across the country.
 - b) Coordinate with the relevant ministries and branches to organize technical training for people carrying out HWM.
 - c) Coordinate with the relevant ministries and branches to improve the HWM knowledge for the leaders and people by the public media.
9. Implement inventory HW annually, summarize the HWM situation all over the country and report to the Prime Minister.

Article 22

Responsibilities of the Ministry of Construction.

1. Instruct the cities and provinces directly under central government level in planning construction of sanitary HW

- treatment facilities, including HW landfill, suitable to the Socio-Economic development planning of the localities.
2. Collaboration with People's Committee in instructing the local Department of Construction to develop the construction plans for the storage, treatment and disposal facilities of HW then submit to the People's Committee for approval.
 3. Collaboration with People's Committee in instructing the local Department for Transport and Public Works to develop and implement the waste management plan (including HW) at their localities.
 4. Collaborate with the cities and provinces directly under central government level to supervise urban management, especially paying attention to the collection, transportation, storage, treatment, and disposal of HW in urban and industrial zones.
 5. Promulgate instructions for the collection, transportation, storage, disposal of HW in construction, especially in urban and industrial zones.
 6. Coordinate and collaborate with MOSTE to study, produce and instruct the use of the industrial type and model of the equipment particularly for HWM activities.

Article 23

Responsibility of the Ministry of Industry

1. Inspect, supervise, and implement all the effective measures to ensure the HW generator strictly follows this regulation. In the event that the HW generator cannot collect, transport, store, dispose of HW, the Ministry of Industry requests the HW generator to sign the contract with the collector, transporter, storage owner and disposer.
2. Mobilize the capital resources to invest in HW treatment facility, replace outdated technology by modern, better technology; coordinate with MOSTE to implement inventory of HW from industries.
3. Coordinate with MOSTE to investigate, assess the environmental pollution level caused by the business and manufacturer, which are under the management of the Ministry of Industry.

Article 24

Responsibility of the Ministry of Health

1. Enhance the inspection, supervision and methods to ensure that hospitals, health stations, health services strictly implement the HWM regulation.
2. Collaborate with the MOSTE, Ministry of Construction in planning, selection of technology, equipment, installation and operation of appropriate incineration system complying with TCVN.
3. Promulgate the regulation on management medical waste.

Article 25

Responsibility of the Ministry of National Defense and Ministry of Interior:

1. Monitoring, inspection and effective measures to ensure that the HW generator under the Ministry of National Defense and Ministry of Interior follows this regulation.
2. Grant the license relating to the HWM regulation for generator, collector, storage owner, transporter, and disposer of HW that have operations within national defense or security sectors.
3. Collaborate with MOSTE and relevant agencies in implementation of training for staff in charge of HWM and awareness raising on HW within their authorities.
4. Collaborate with MOSTE, The People's Committee at central or local level and the relevant ministries and branches to response to serious incidents caused by HW.
5. A HW generator which is licensed by the Ministry of National Defense and Ministry of Interior, but is entirely economic entity by nature must follow all the stipulation in this regulation.

Article 26

Responsibilities of the Ministry of Investment and Planning, Ministry of Finance, Ministry of Trade

1. Based on the annual plan and long-term plan of the ministries, agencies and provinces on HW management, provide capital resources, including foreign investment capital required in order to ensure the necessary conditions for the Ministries, Branches, local bodies to implement the HW management plan.
2. Collaborate with MOSTE to study, propose mechanism, financial policies, taxation for investment in and importation of equipment, technology for the HW management.
3. Collaborate with MOSTE in development and promulgation of regulation on HWM fee and fee of granting environmental license.

Article 27

Responsibilities of the People's Committees of the Cities and provinces directly under central government level:

1. Instruct the Departments of Construction to develop planning for HW storage, treatment, disposal and landfill

- facilities within areas of their authorities.
2. Instruct Departments of Transportation and Public Works to make the feasibility study (for organizing, evaluating measures, equipment, technology, capital etc.) and organize the implementation of the waste management plan, including collection, transportation, treatment and disposal of HW in the localities.
 3. Instruct DOSTE to:
 - a) Grant registration number and environmental licenses to the generator, collector, transporter, and disposer of HW (according to Annex 2A, 2B of this regulation).
 - b) Provide guidance on the content and requirements of the environmental impact assessment report to HW storage owner, transporter, disposer, and landfill operator for submission to the Agency in charge of State Management of Environment Protection for approval.
 - c) Inspect and assess environmental pollution at the HW storage, treatment, disposal and landfill areas within localities.
 - d) Implement training and awareness raising on HWM within localities.
 - e) Implement annual inventory of HW, report to MOSTE for summarising and submission to the Prime.
 4. Coordinate and collaborate with the Ministry of Construction to make decisions on various aspects including land-use planning for HW treatment and landfill areas; Organize within authorities services for effective HW management; exploiting the capital from various economic sectors of the cities, provinces from waste fees to support from domestic and foreign sources (aid, loan with priority interest rate or JV with foreign partner) aiming at successful implementation of HWM.
 5. Coordinate with relevant ministries and branches to investigate HWM activities.
 6. Receive, settle any dispute, claim, accusation or proposal on HWM within their authorities or hand over to higher level.

Chapter 6

Clause on Implementation

Article 28

The ministries, agencies and provinces that manage generators of HW must instruct them to strictly implement this regulation. They are in charge of receiving, considering and resolving any dispute, claim or proposal arising about HWM within their authorities under the Laws.

Article 29

Specialized inspectors under MOSTE will carry out special inspections for HWM.
The Minister of MOSTE is responsible to the government to implement HWM inspections.

Article 30

Any organization or individual who violates the regulation will be punished according to its characteristics and level, in the event of causing damage, he has to compensate according to the Law.

Individual that seriously violates the regulation will be prosecuted in front of the Criminal Court.

Article 31

During the implementation of this regulation, any arising problems should be informed to the Prime Minister for the solution.

Deputy Prime Minister
Pham Gia Khiem

Annex 1; (omitted)

- List A: Wastes characterized as Hazardous Wastes
- List B: Wastes characterized as Non-Hazardous Wastes

Annex 2A; (omitted)

- Hazardous Waste Management Registration for Generator
- Registration Document for Hazardous Waste Generator

Annex 2B; (omitted)

- Application form for collection, transportation, storage, treatment and disposal of Hazardous Waste
- License for Hazardous Waste Management (collection, transportation, storage, treatment and disposal)

Annex 3: Hazardous Wastes Manifest Document (omitted)

Annex 4: Hazardous Wastes Management Report (omitted)

Appendix 4
Circular Letter of Guidance on Setting Up and Reviewing the
Environmental Impact Assessment (EIA) Report for
Investment Projects
(Circular Letter No.490/1998/TT-BKHCMNT)

**MINISTRY OF SCIENCE,
TECHNOLOGY & ENVIRONMENT**

THE SOCIALIST REPUBLIC OF VIET NAM
Independence - Freedom - Happiness

Registry. No. 490/1998/TT-BKHCMNT

Hanoi, April 29th, 1998

**CIRCULAR LETTER
OF GUIDANCE ON SETTING UP & REVIEWING
The Environmental Impact Assessment (EIA) Report for Investment Projects**

- In accordance with the Law on Environmental Protection passed by the National Assembly of the Socialist Republic of Viet Nam on December 27th, 1993 and issued by the President of the Socialist Republic of Viet Nam on January, 10th, 1994;
- In accordance with the Government Decree No. 175/CP of October 18th, 1994, relating to the Guideline on implementing the Law on Environmental Protection;
- In accordance with the Government Decree No. 10/1998/ND-CP of January 23rd, 1998 relating to several incentives and assurances provided for foreign direct investment activities in Viet Nam;
- In accordance with the Government Prime Minister's Instruction No. 11/1998 CT-TTg of March 16th, 1998 relating to the implementation of the Government Decree No. 10/1998/ND-CP and improvements of foreign direct investment procedures;
- In accordance with the Government Decree No. 22/CP of May 22nd, 1993, relating to the mandate, responsibilities, and institutional organization of the Ministry of Science, Technology and Environment,

The Ministry of Science, Technology and Environment (MOSTE) by this Circular Letter provides a guidance on setting up and reviewing the environmental impact assessment (EIA) report for domestic, joint venture and foreign direct investment projects in Viet Nam.

. GENERAL PRINCIPLES

1. Domestic, joint venture and foreign 100% capital investment projects and other forms of investments (hereafter called the investment projects) to be taken place within the territory of Vietnam, shall be required to comply with environmental protection provisions stipulated in this Circular Letter.

2. MOSTE hereto stipulates a list of the investment projects which are divided into two categories:

1. Those investment projects which are subject to the requirement of setting up and reviewing the EIA report are called in this Circular Letter as projects in Category . These include all projects which may likely cause potentially and widely spread environmental impacts and accidents, and others which may cause constraints to the environmental control or may be non-point pollution sources, are listed in Annex attached.

Investment Projects in this Category shall be eligible to apply a "Registration for Securing Environmental Standards", if they are invested into any Industrial Estates or Export Processing Zones which have been granted a decision for approval on the EIA Report.

2. Other investment projects not listed in Category , shall fall in projects in Category . These are eligible to apply a Registration for Securing Environmental Standards provided that their proponents shall have to set up and analyze themselves their own EIA reports.

3. The Decision on Approval of the EIA Report or the Registration for Securing Environmental Standards shall provide an environmentally legal basis on which the Government Competent Authorities evaluate and approve the follow-up activities of a proposed project.

. STAGES OF THE IMPLEMENTATION

. 1. Stage of Investment License Application

1. For Projects in Category :

When submitting the project documents for projects in Category , one part or a chapter must provide an initial description of the potentially environmental impacts that may result from the proposed project (see in Annex attached). This part or chapter shall provide a basis on which the Government Management Agencies of

Environmental Protection evaluate in the review process of a project document.

2. For Projects in Category :

Projects in Category shall be required to prepare and submit the Registration for Securing Environmental Standards to the Government Management Agencies of Environmental Protection for evaluation.

+ Contents of the Registration for Securing Environmental Standards are provided for in Annex attached to the Circular Letter.

+ The Application Document includes:

- The application form for the Registration for Securing Environmental Standards as prescribed in Annex 2;
- Three (3) copies of the Registration for Securing Environmental Standards, and one additional copy in English is required in cases that the project is a foreign direct or joint venture investment;
- One copy of the Feasibility Study or the Economic-Technical Study of the proposed project.

. 2. Stage of design and construction

1. Having granted an investment license and located a site of a project, projects in Category shall have to set up and submit the EIA report to the Government Management Agencies of Environmental Protection for review.

2. Contents of the EIA report are provided for in Annex 2 of the Government Decree No. 175/CP of October 18th, 1994.

3. The Application Document for the EIA Review process includes:

- The application form for the EIA Review as stipulated in Annex 1.1 attached;
- Seven (07) copies of EIA report and one additional copy in English is required in cases that the project is a foreign direct or joint venture investment;
- one (01) copy of the Feasibility Study or the Economic-Technical Study of the proposed project.

. 3. Stage of construction completion

Prior to operations of the proposed project, the Government Management Agencies of Environmental Protection shall have responsibilities:

- to inspect in collaboration with the construction licensing authorities, any waste treatment works and other safety conditions as stipulated by the environmental protection regulations;
- to enforce the compliance of environmental conditions set forth in the reviewed EIA report or the certified Registration for Securing Environmental Standards if any failure to comply with approved environmental protection options is identified;
- to consider and issue an environmental permit only when all requirements of environmental protection have been fully satisfied by the proponent.

. ORGANIZATION OF THE EIA REPORT REVIEW

1. Division of responsibility for the EIA report review and for evaluation of the Registration for Securing Environmental Standards is as stipulated in Annex , The Government Decree 175/CP of October 18, 1994.

2. The review of the EIA reports shall be carried out in accordance with provisions provided for by MOSTE Instruction Nos. 1806/QD-MTg and 1807/MTg of December 31, 1994.

3. The Decision on the approval of EIA report (AnnexV) for projects in Category and the certification of the Registration for Securing Environmental Standards (Annex) for projects in Category , shall be granted by the relevant Government Agency for review of the EIA report or for evaluation of the Registration for Securing Environmental Standards. And the relevant level of government shall be also responsible to monitor and inspect environmental protection activities taken by the project.

4. For some cases, the local Government Management Agencies of Environmental Protection may be allowed to carry out the EIA report review of projects in Category and the evaluation of projects in Category , which are not under their responsibility, provided that a request in writing for the authorization of review or evaluation is

submitted to and approved by MOSTE.

5. Review of an EIA report is due within 60 days of the date a sufficient and eligible document of the EIA report is received by the relevant Government Management Agencies of Environmental Protection. In case that the EIA report is unsatisfactory, the EIA report review agencies shall have 5 days of the date the EIA report is received, to notify the proponent requirements for adjustment or addition. Within 10 days following the date of the EIA report is approved, the relevant Appraisal Agencies will issue a decision on the approval of the EIA report of a proposed project.
6. The evaluation of "Registration for Securing Environmental Standards" and the issuance of an "Environmental Approval Certificate" are due within 20 days of the date the eligible sufficient Registration Document is received by the Government Management Agencies of Environmental Protection. In case that the Registration document is not eligible, the review agencies shall have 5 days of the date the Registration document is received, to notify the proponent requirements of adjustment or addition.

IV. ENVIRONMENTAL STANDARDS

1. All investment projects to be implemented within the territory of Viet Nam shall have to apply the Vietnamese Environmental Standards issued by MOSTE. Those projects to be implemented at provinces where local environmental standards are available, may be adopted, provided that such local standards must be more stringent than those standards issued by MOSTE.
2. In case that other environmental standards required are not stipulated by the Vietnamese Environmental Standards, the proponents may apply to adopt a set of or any standards developed by other advanced countries, provided that the adoption is subject to the permit in writing granted by MOSTE.

. IMPLEMENTATION PROVISIONS

- This Circular Letter replaces the Circular Letter No.1100/TT-MTg of 20 August 1997 by MOSTE.
- MOSTE authorizes the Provincial Departments of Science, Technology and Environment to monitor and inspect seriously the implementation of decisions on approval of EIA reports, certificates of the Registration for Securing Environmental Standards and the compliance of existing environmental protection regulations by all the projects being implemented within territories under their jurisdictions. Serious legal treatments shall be applied for any violations of projects against the environmental protection regulations.
- The National Environment Agency of MOSTE or Departments of Science, Technology and Environment shall be responsible to conduct the evaluation and issuance of the Registration for Securing Environmental Standards for proposed projects as decentralized in Item 1, Paragraph of this Circular Letter.
- Those EIA reports which were submitted to the Government Management Agencies of Environmental Protection before the date that this Circular Letter comes into effect, shall be reviewed in accordance with the previous EIA review procedures.
- This Circular Letter shall come into effect within 15 days following the date of the signature of issuance.

c.c.to:

- The Office of Government (for report);
- Line Ministries, Ministerial level Agencies, Governmental Agencies;
- Provincial and City People's Committees;
- Departments of Science, Technology & Environment;
- Departments of Planning & Investment; Departments of Construction;
- file: The office of MOSTE and NEA

Minister of Science, Technology & Environment
(signed)
Chu Tuan Nha

ANNEX

**LIST OF PROJECTS
SUBJECT TO REQUIREMENT OF EIA REPORT SUBMITTAL AND APPROVAL**

1. **Investment projects** to be implemented within or adjacent to areas of environmental sensitivity, natural resource protected areas, tourist areas, areas of internationally and nationally valued historical and cultural sites
2. **Planning**
 - 2.1 Regional Development;
 - 2.2 Sectoral Development;
 - 2.3 Urban Development;
 - 2.4 Industrial estate/ Export processing zone development;
3. **Oil and Gas**
 - 3.1 Exploitation;
 - 3.2 Processing;
 - 3.3 Transportation;
 - 3.4 Storage of oil and gasoline (with capacity of more than 20,000 m³)
4. **Metallurgy** including steel, iron cast, and non-ferrous metal factories (with capacity of more than 100,000 tons per year)
5. **Tannery** factory (with capacity of over 10,000 tons of product per year)
6. **Textile/dye** factory (with capacity of over 20 million meters per year)
7. **Paint** factory (with capacity of over 1,000 tons products per year)
8. **Cane Sugar** factory (with capacity of over 100,000 tons of cane per year)
9. **Food processing** plant (with capacity of over 1,000 tons of product per year)
10. **Freezing - refrigeration** plant (with capacity of 1,000 tons of product per year)
11. **Thermal power** plant (with capacity of over 200 MW)
12. **Pulp and Paper** mill (with capacity of over 40,000 tons of pulp per year)
13. **Cement** factory (with capacity of over one million tons per year)
14. **Tourism and entertainment resort** (with area of over 100 hectare)
15. **Airport**
16. **Port** (with ship capacity of over 10,000 DW tons)
17. **Railway, expressways & highways** of (grades 1,2,3 as stipulated by TCVN 4054-85) (with length of over 50 km)
18. **Hydropower** plant (with reservoir of over 100 million m³)
19. **Water Resource** Work (irrigation, drainage and salt water control, etc.) (with area of over 10,000 hectare)
20. **Waste treatment** facilities (Centered wastewater treatment plant with capacity of over 100,000 m³ per day; solid waste landfill)
21. **Mineral mining, construction materials factory** (with total solid mineral, waste soil & rock volume of 100,000 m³ per year)
22. **Timber harvesting** farm (all scales)
23. **Aquaculture** farm (with area of over 200 hectare)
24. **Toxic chemical** production, storage and usage (all scales)
25. **Nuclear** Reactor (all scales)

Note: If the above prescribed projects to be invested in any industrial estates or export processing zones which have been granted a decision on EIA report approval, shall be eligible to only apply the Registration for Securing Environmental Standards provided that they will set up and analyze themselves their EIA reports.

ANNEX

DESCRIPTION OF ENVIRONMENTAL IMPACT FACTORS

(included in the Feasibility Study or the Economic-Technical Study Report for Investment license)

. SUMMARY OF MAJOR ENVIRONMENTAL IMPACT FACTORS

1. Describe data on existing environmental conditions (air, ground and surface water quality and ecosystems, etc.) of the site where a proposed project to be implemented. Give general comments on the current levels of pollution at the proposed site of a project.
2. Describe the production technology processes or flow charts, usage of raw materials and fuels, a list of chemicals, etc. (if these are not clearly described in the economic-technical studies).
3. Describe in details major factors which may cause environmental effects by the project implementation activities (specify estimates of air emissions, wastewater and solid waste discharges, and levels of noise, etc.). Predict level of effects which may be occurred on the environment.

. SUMMARY OF PROPOSED REMEDY OPTIONS FOR NEGATIVE ENVIRONMENTAL EFFECTS BY THE PROJECT

(FOR PROJECTS UNDER THE STAGE OF INVESTMENT LICENSE APPLICATION)
**CONTENTS OF THE REGISTRATION
 FOR SECURING ENVIRONMENTAL STANDARDS**

Project title:
 Proponent's Address:
 Telephone number:
 Fax number:

1. Description of the site where the project activities to be implemented

- Location
- Area of the space
- The shortest distance from residential areas and other industries
- Existing land use
- Water supply sources, water extraction locations, water demand per day
- Transport networks of raw materials and finished products
- Wastewater receiving environment from the project activities
- Solid waste storage and treatment sites

2. Summary of production technologies (Note: if the proposed project includes raw materials extraction and supplies that relevant issues must be described in details)

- Total capital investment
- Lists of raw materials, fuels, by-products (the characteristics, annual demands of consumption, suppliers' address)
- Modes of raw materials, fuel and by-product transports, supplies and storage
- Capacities
- Production process flow charts (Note: Description in details of supporting stages including water supply treatment, generators, boilers, heaters, cooling systems, etc.)
- Equipment specifications
- Quality of Products
- Modes of product storage and transport

3. Pollution Sources

- Air emissions
 - + Generation sources
 - + Loads
 - + Concentration of air pollutants
- Wastewater Discharges (Note: clarify related parameters of cooling water, recycled water in the production process)
 - + Generation sources
 - + Loads
 - + Concentration of contaminants
- Solid wastes
 - + Generation sources
 - + Loads
 - + Concentration of pollutants
- Accidents by the project activities (fires, explosions, chemical leakage, oil spillage, etc.)
 - + causes of accidents
 - + Scale of effects

4. Pollution mitigation measures

- Air pollutants collection and treatment systems:
 - + the height of stacks
 - + treatment equipment specifications
 - + treatment technologies and efficiencies
 - + usage of chemicals (volumes, compositions)
 - + estimated costs of construction, installation, and operation.
- Wastewater collection and treatment systems:
 - + collection channels and drainage
 - + structure of treatment tanks
 - + treatment technologies and efficiencies
 - + usage of chemicals (volumes, compositions)

- + contaminants from treatment processes
- + estimated costs of construction, installation, and operation
- Solid waste collection and treatment process:
 - + structure of solid waste storage/tanks
 - + transport processes
 - + treatment techniques (drying, solidification, landfill, incineration, composting, etc.)
 - + estimated costs of construction, installation and treatment
- Percentage of vegetation cover in open spaces of the factory
- Emergency responses and preparedness options:
 - + equipment
 - + procedures
 - + usage of chemicals
 - + effectiveness
 - + estimated costs of equipment purchases and periodical training

5. Environmental monitoring programs

- monitoring locations
- monitoring criteria
- monitoring frequency
- estimated costs of monitoring

6. Commitments in securing environmental standards

- Application of the Vietnamese environmental standards
- Adoption of foreign environmental standards which are not stipulated by Viet Nam (name of countries, year of issuance, issuance authorities, validity of standards). (*Note: copies of sufficient standard contents are attached*)
- Completion time of treatment facilities
- Pledge to be fully liable according to the Vietnamese laws for any violations against international conventions, the Vietnamese environmental standards and for any environmental pollution accident.

Done at....., on (date).....(month).....(year).....
 Proponent's signature (*full name, position, stamp*)

Annex .1

THE SOCIALIST REPUBLIC OF VIETNAM
Independence-Freedom-Happiness

At....., on (date).....(month).....(year).....

APPLICATION FOR THE EIA REPORT REVIEW

To: Minister of Science, Technology & Environment
(or Chairman of Provincial/City People's Committees)

We, the undersigned, are..... the proponent of.....
.....
Contact address of applicant(s).....
Location of the project site.....
Telephone No.....
Fax No.....

submit to the Ministry (Provincial/City People's Committee) the following documents:

- Economic-Technical Feasibility Study (one copy in Vietnamese);
- Environmental Impact Assessment Report (seven copies in Vietnamese and one copy in English).

We hereby declare that all the data given in this application is to the best of our knowledge and belief true and correct. And we also pledge that those chemicals and species of microorganisms are stipulated by the Prohibition List of Viet Nam or by the International Conventions to which Viet Nam has adhered, will not be used. We also guarantee that the standards and criteria developed by other countries and the international organizations, which are exerted and adopted in our Report are true and valid.

We pledge to be fully liable to the laws of the Socialist Republic of Viet Nam if any offenses are committed.

We apply for a review of our report by the Ministry of Science, Technology and Environment (or Provincial/City People's Committee(s) authorized by the Ministry).

Signature of proponent and stamp

Annex .2

THE SOCIALIST REPUBLIC OF VIETNAM
Independence-Freedom-Happiness

At....., on (date).....(month).....(year).....

APPLICATION FOR A REGISTRATION FOR SECURING ENVIRONMENTAL STANDARDS

To: Minister of Science, Technology & Environment
(or Chairman of Provincial/City People's Committees)

We, the undersigned, are..... the proponent of.....
.....
Contact address of applicant(s).....
Location of the project site.....
Telephone No.....
Fax No.....

submit to the Ministry (Provincial/City People's Committee) the following documents:

- Economic-Technical Feasibility Study (one copy in Vietnamese); and
- Registration for Securing Environmental Standards (three copies in Vietnamese and one copy in English).

We hereby declare that all the data given in this application is to the best of our knowledge and belief true and correct. And we also pledge that those chemicals and species of microorganisms are stipulated by the Prohibition List of Viet Nam or by the International Conventions to which Viet Nam has adhered, will not be used. We also guarantee that the standards and criteria developed by other countries and the international organizations, which are exerted and adopted in our Report are true and valid. We will undertake that the construction of waste treatment work(s) shall be completed as stipulated in the schedule, and sufficient funds of the waste treatment operations and environmental monitoring activities shall be provided.

We pledge to be fully liable to the laws of the Socialist Republic of Viet Nam if any offenses are committed.

We apply for a certification of the Registration by the Ministry of Science, Technology and Environment (or Provincial/City People's Committee(s) authorized by the Ministry).

Signature of proponent and stamp

Annex

MINISTRY OF SCIENCE, TECHNOLOGY & ENVIRONMENT
(Provincial/City People's Committee)

THE SOCIALIST REPUBLIC OF VIET NAM
Independence-Freedom-Happiness

Registry No. /QD-BKHCMT At..... (date).....(month).....(year).....

DECISION BY THE MINISTER OF SCIENCE, TECHNOLOGY & ENVIRONMENT
(or by Chairman of Provincial/City People's Committee)
on the approval of the EIA report of the proposed project

THE MINISTER OF SCIENCE, TECHNOLOGY & ENVIRONMENT
(the Chairman of Provincial/City People's Committee)

- In accordance with the Law on Environmental Protection passed by the National Assembly of the S.R.V.N on 27 December, 1993;
- In accordance with the Governmental Decree 175/CP of October, 18th, 1994 on the Guidance to the implementation of the Law on Environmental Protection;
- In accordance with the Governmental Decree 22/CP of May 22nd, 1993 on the mandate, responsibilities, and institutional organization of the Ministry of Science, Technology and Environment (Provincial/City People's Committee);
- Considering the application for review of the EIA report dated (date).....(month).....(year).....by.....;
- Reviewing the meeting minute prepared and submitted by the EIA report Review Council on the project.....held on (date).....(month).....(year).....,

DECIDES

Article 1. To approve contents of the Environmental Impact Assessment Report of the Project..... which was reviewed by the Environmental Review Council on (date).....(month).....(year)....., and additional contents (conditions) are required *(by the Environmental Review Council)*.

Article 2. Proponent of the project shall be responsible to comply with contents stated in the EIA Report and additional requirements attached to this Decision.

Article 3. This EIA Report of the project and the requirements for the project proponent shall be a basis on which the Government Management Agencies of Environmental Protection monitor the implementation of environmental protection by the project.

Article 4. Proponent of the project shall report in a written form, the completion of environmental works to the Government Management Agencies of Environmental Protection for inspection.

Article 5. To authorize the Department of Science, Technology and Environment of the Province/ City.....to conduct environmental monitoring and inspection of the implementation of environmental protection by the project.

c.c.:

- The proponent
- Relevant Ministries/ Agencies
- Provincial/City People's Committees
- Provincial/City Department of Science, Technology & Environment
- Files: Office of the Ministry, Provincial/City

Minister of Science, Technology & Environment
(Chairman of Provincial/City People's Committee)

(Signature)

Annex

MINISTRY OF SCIENCE, TECHNOLOGY & ENVIRONMENT
(Provincial/City People's Committee)

THE SOCIALIST REPUBLIC OF VIET NAM
Independence-Freedom-Happiness

NATIONAL ENVIRONMENT AGENCY
(Department of Science, Technology & Environment)

Registry No. /CMTg At..... (date).....(month).....(year).....
(Department Registry No.)

CERTIFICATE FOR REGISTRATION FOR SECURING ENVIRONMENTAL STANDARDS
For the project.....

THE DIRECTOR GENERAL OF NATIONAL ENVIRONMENT AGENCY
(or the Director of Provincial/City Department of Science, Technology & Environment)

CERTIFIES

Article 1. That the Project.....submitted its Registration for Securing Environmental Standards on (date).....(month).....(year).....

Article 2. Proponent of the project shall be responsible to comply with contents stated in the Registration for Securing Environmental Standards.

Article 3. The Registration for Securing Environmental Standards of the project shall be a basis on which the Government Management Agencies of Environmental Protection monitor the implementation of environmental protection by the project.

Article 4. Proponent of the project shall report in a written form the completion of environmental work(s) to the Government Management Agencies of Environmental Protection for inspection.

c. c. :

- Proponent of the project
- Relevant Ministries/Agencies
- Provincial/City People's Committee
- Provincial/City Department of Science, Technology & Environment
- File: Office of NEA

Director General National Environment Agency
(Director of Provincial/City Department of Science, Technology & Environment)

(Signature)

Appendix 5
Water Quality – Surface Water Quality Standards
(TCVN5942-1995)

Water quality – Surface water quality standard

1. Scope
 - 1.1 This standard specifies parameter limits and maximum allowable concentrations of pollutants in surface water.
 - 1.2 This standard is applicable to control of a surface water source.
2. Limitation value
 - 2.1 Parameter limits and maximum allowable concentration of pollutants in surface water are specified in the table 1.
 - 2.2 Standard methods of analysis of parameters and pollutant concentrations of surface water are specified in available current TCVN.

Table 1 Parameter limits and maximum allowable concentration of pollutants in surface water

No	Parameter and substance	Unit	Limitation value	
			A	B
1	pH value		6 - 8.5	5.5 - 9
2	BOD ₅ (20 °C)	mg/liter	< 4	< 25
3	COD	mg/liter	< 10	< 35
4	DO (Dissolved oxygen)	mg/liter	6	2
5	SS (Suspended solids)	mg/liter	20	80
6	Arsen	mg/liter	0.05	0.1
7	Barium	mg/liter	1	4
8	Cadmium	mg/liter	0.01	0.02
9	Lead	mg/liter	0.05	0.1
10	Chromium, Hexavalent	mg/liter	0.5	0.05
11	Chromium, Trivalent	mg/liter	0.1	1
12	Copper	mg/liter	0.1	1
13	Zinc	mg/liter	1	2
14	Manganese	mg/liter	0.1	0.8
15	Nickel	mg/liter	0.1	1
16	Iron	mg/liter	1	2
17	Mercury	mg/liter	0.001	0.002
18	Tin	mg/liter	1	2
19	Ammonia (as N)	mg/liter	0.05	1
20	Fluoride	mg/liter	1	1.5
21	Nitrate (as N)	mg/liter	10	15
22	Nitrite (as N)	mg/liter	0.01	0.05
23	Cyanide	mg/liter	0.01	0.05
24	Phenol compounds	mg/liter	0.001	0.02
25	Oil and grease	mg/liter	N.D.	0.3
26	Detergent	mg/liter	0.5	0.5
27	Coliform	MPN/100ml	5000	10000
28	Total pesticides (except DDT)	mg/liter	0.15	0.15
29	DDT	mg/liter	0.01	0.01
30	Gross alpha activity	Bq/liter	0.1	0.1
31	Gross beta activity	Bq/liter	1.0	1.0

Note :

- Values in the column A are applied to the surface water using for source of domestic water supply with appropriate treatments.
- Values in the column B are applied to the surface water using for the purposes other than domestic water supply. Quality criteria of water for aquatic life are specified in a separate standard.

Appendix 6
Air Quality – Ambient Air Quality Standards
(TCVN5937-1995)

Air quality – Ambient air quality standard

1. Scope

1.1 This standard specifies concentration limits of main constituents in ambient air (carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead particulate, suspended particles).

1.2 This standard applies to evaluation of ambient air quality and to monitoring of air pollution status.

2. Limitation values

The limits of main parameters in ambient are shown in the table 1.

Table 1 Ambient air quality standards

(mg/m ³)				
No	Parameter	1hr-averaging time	8hr-averaging time	24hr-averaging time
1	CO	40	10	5
2	NO ₂	0.4		0.1
3	SO ₂	0.5		0.3
4	Lead (particulate)(Pb)			0.005
5	O ₃ (ozone)	0.2		0.06
6	SS(Suspended particulate matter)	0.3		0.2

Note – Standard methods of analysis of ambient air quality parameters are specified in available current TCVN.

Appendix 7
Sources of Environmental Information in Vietnam and Japan

1 . ベトナム / in Vietnam

(1) ベトナム政府機関及びその他機関 / Vietnamese government agencies and other institutions

1) 科学技術環境省 (MOSTE) / Ministry of Science, Technology and Environment : MOSTE

39 Tran Hung Dao St., Hanoi, Vietnam

phone +84-4-9439731

fax +84-4-8252733

URL <http://www.moste.gov.vn/>

2) 国家環境庁 (NEA) / National Environment Agency : NEA

67 Nguyen Du St., Hanoi, Vietnam

phone +84-4-8260781/8262902

Fax +84-4-9342123

URL <http://www.nea.gov.vn/>

3) ハノイ市科学技術環境局 (ハノイ市 DOSTE) / Department of Science, Technology and Environment, Hanoi : DOSTE Hanoi

2 Phan Chu Trinh Alley, Hanoi, Vietnam

phone +84-4-8227591

fax +84-4-8251894

4) ホーチミン市科学技術環境局 (ホーチミン市 DOSTE) / Department of Science, Technology and Environment, Ho Chi Minh City : DOSTE HCMC

244 Dien Bien Phu, District 1, Ho Chi Minh City, Vietnam

phone +84-8-9327831

fax +84-8-8242710

5) 計画投資省 (MPI) / Ministry of Planning and Investment : MPI

56 Quoc Tu Giam St., Hanoi, Vietnam

phone +84-4-8235606

fax +84-4-8459271

URL http://khoahoc.vnn.vn/mpi_website/

6) ホーチミン市計画投資局 (ホーチミン市 DPI) / Department of Planning and Investment, Ho Chi Minh City : DPI HCMC

32 Le Thanh Ton St., Dist 1., Ho Chi Minh City, Vietnam

phone +84-8-8294988

fax +84-8-8295008

URL <http://www.hcminvest.gov.vn/>

7) ベトナム規格センター (VSC) / Vietnam Standards Centre : VSC

8 Hoang Quoc Viet, Cau Giay District, Hanoi, Vietnam

phone +84-4-7564407

fax +84-4-8361771

URL http://www.tcvn.gov.vn/english/main_en.htm

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

- 1) ベトナム日本国大使館 / Embassy of Japan in Vietnam
27 Lieu Giai, Ba Dinh District, Hanoi, Vietnam
phone +84-4-8463000
fax +84-4-8463043
- 2) ホーチミン日本国総領事館 / Consulate-General of Japan at Ho Chi Minh City
13-17 Nguyen Hue, District 1, Ho Chi Minh City, Vietnam
phone +84-8-8225314
fax +84-8-8225316
- 3) ジェトロ・ハノイ事務所 / JETRO (Japan External Trade Organization) Hanoi
3rd Floor, 63 Ly Thai To, Hanoi, Vietnam
phone +84-4-8250630
fax +84-4-8250552
- 4) ジェトロ・ホーチミン事務所 / JETRO (Japan External Trade Organization) Ho Chi Minh
14th Floor, Sun Wah Tower, 115 Nguyen Hue St., District 1, Ho Chi Minh City, Vietnam
phone +84-8-8219363
fax +84-8-8219362
- 5) ベトナム日本商工会 / The Japan Business Association in Vietnam
Room 305, 63 Ly Thai To, Hanoi, Vietnam
phone +84-4-9343570
fax +84-4-9343571
- 6) ホーチミン日本商工会 / Japanese Business Association of Ho Chi Minh City
#1407 14F, Sun Wah Tower, 115 Nguyen Hue St., District 1, Ho Chi Minh City, Vietnam
phone +84-8-8219369
fax +84-8-8219370
URL <http://www.jbah.info/>
- 7) 国際協力事業団ベトナム事務所/ JICA (Japan International Cooperation Agency) in Vietnam
11th Floor, Office Tower, Daeha Business Center, 360 Kim Ma St., Ba Dinh District, Hanoi,
Vietnam
phone +84-4-8315005
fax +84-4-8315009
URL <http://www.jicavietnam.org.vn/>
- 8) 国際協力銀行ハノイ駐在員事務所 / JBIC (Japan Bank for International Cooperation)
Representative Office in Hanoi
6th Floor, 63 Ly Thai To, Hanoi, Vietnam
phone +84-4-8248934
fax +84-4-8248937

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) 環境省地球環境局環境協力室 / Office of Overseas Environmental Cooperation, Global Environment Bureau, Ministry of the Environment
〒100-8975 東京都千代田区霞が関 1-2-2 中央合同庁舎 5 号館
1-2-2 Kasumigaseki, Chiyoda-ku, Tokyo 100-8975 Japan
phone (03) 3581-3351 (代)
fax (03) 3581-3423
URL <http://www.env.go.jp/>

- 2) 日本貿易振興会 (ジェトロ) / JETRO (Japan External Trade Organization)
〒105-8466 東京都港区虎ノ門 2-2-5 共同通信会館
2-2-5 Toranomom, Minato-ku, Tokyo 105-8466 Japan
phone (03) 3582-5179 (海外調査部アジア大洋州課)
URL <http://www.jetro.go.jp/top-j/>

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

- 4) 国際協力事業団 / JICA (Japan International Cooperation Agency)
〒151-8558 東京都渋谷区代々木 2-1-1 新宿マインズタワー 6～13 階
6-13F, Shinjuku Maynds Tower 1-1, Yoyogi 2-chome, Shibuya-ku, Tokyo 151-8558 Japan
phone (03) 5352-5311
URL <http://www.jica.go.jp/>

- 5) 国際協力銀行 / Japan Bank for International Cooperation
〒100-8144 東京都千代田区大手町 1-4-1
1-4-1 Otemachi, Chiyoda-ku, Tokyo 100-8144 Japan
phone (03) 5218-3101
fax (03) 5218-3955
URL <http://www.jbic.go.jp/japanese/>

- 6) 経済団体連合会 / Keidanren, Japan Federation of Economic Organizations
〒100-8188 東京都千代田区大手町 1-9-4 (経団連会館)
1-9-4 Otemachi, Chiyoda-ku, Tokyo 100-8188 Japan
phone (03) 5204-1500
fax (03) 5255-6255
URL <http://www.keidanren.or.jp/indexj.html>

7) 日本商工会議所国際部 / International Division, Japan Chamber of Commerce and Industry
 〒100-0005 東京都千代田区丸の内 3-2-2 東京商工会議所ビル 6 階
 6F, Tokyo-Syokokaigisho Building, 3-2-2, Marunouchi, Chiyoda-ku, Tokyo 100-0005 Japan
 phone (03) 3283-7824
 URL <http://www.jcci.or.jp/>

8) (財)地球・人間環境フォーラム / Global Environmental 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
 URL <http://www.shonan.ne.jp/~gef20/gef/>

(2) ベトナム政府機関及びその他機関 / Vietnamese government agencies and other institutions

1) ベトナム社会主義共和国大使館/ Embassy of the Socialist Republic of Viet Nam in Japan
 〒151-0062 東京都渋谷区元代々木町 50-11
 50-11 Moto-Yoyogicho, Shibuya-ku, Tokyo 151-0062 Japan
 phone (03) 3466-3311
 URL http://www.vietnamembassy.jp/index_j.html

2) 大阪ベトナム社会主義共和国総領事館 / Consulate-General of the Socialist Republic of Viet Nam in Osaka
 〒541-0059 大阪府中央区博労町 1-4-10 エステート博労町ビル 10 階
 10F, Estate Bakurocho Building, 1-4-10 Bakuro-cho, Chuo-ku, Osaka 541-0059 Japan
 phone (06) 6263-1600
 fax (06) 6263-1770

3) ベトナム商工会議所日本代表事務所 / Representative Office of Vietnam Chamber of Commerce and Industry in Japan
 〒107-0052 東京都港区赤坂 6-4-20
 6-4-20 Akasaka, Minato-ku, Tokyo 107-0052 Japan
 phone (03) 3585-7349
 fax (03) 3585-8492

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(1) 日本語 / in Japanese

- ・「ビジネスガイド・ベトナム（新版）」（日本貿易振興会、2001年）
- ・「進出企業実態調査アジア編～日系製造業の活動状況～2001年版」（日本貿易振興会、2001年）
- ・「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」（日本貿易振興会、1999年）
- ・「海外進出企業総覧<国別編>2001年版」（東洋経済新報社、2001年）
- ・「ジェットロ投資白書 2001年版」（日本貿易振興会、2001年）
- ・「発展途上国における廃棄物の動態調査と将来における適正処理の提言 - ヴィエトナム国における廃棄物処理の実態調査 -」（社団法人海外環境協力センター、2000年）
- ・「ベトナム環境プロファイル」（海外経済協力基金、1997年）
- ・「ヴィエトナム国産業公害対策マスタープラン調査（産業廃水）ファイナルレポート」（国際協力事業団、2000年）
- ・「ベトナム 経済・貿易の動向と見通し」（財団法人世界経済情報サービス：WEI S、2000年）
- ・「平成7年度民間投資促進のための環境配慮指導事業 ベトナムの投資と環境保全制度調査報告書」（社団法人海外コンサルティング企業協会、1995年）
- ・「リスク・レビュー Vol.18 - アジア諸国の環境法（第1部） -」（日本火災海上保険株式会社、1995年）

(2) 英語 / in English

- ・ *National Environment Agency Establishment & Development* (National Environment Agency, 2000)
- ・ *National Strategy for Environmental 2001-2010* (Ministry of Science, Technology and Environment, 2000)
- ・ *Environmental Protection Activities in Ho Chi Minh City 2000-2001* (Department of Science, Technology and Environment of Ho Chi Minh City, 2000)
- ・ Alan K.J. Tan, *Apcel Report: Vietnam "Preliminary Assessment of Viet Nam's Environmental Law"* (National University of Singapore, 1998)

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- ・ ホーチミン市科学技術環境局 / Department of Science, Technology and Environment, Ho Chi Minh City
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- ・ ハノイ都市工科大学 / Hanoi University of Civil Engineering
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- ・ 日本鋼管テクノサービス / Nippon Kokan Techno Service Co., Ltd.

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**Overseas Environmental Measures of
Japanese Companies (Vietnam)**

- Research Report on Trends in Environmental Considerations
related to Overseas Activities of Japanese Companies FY2001 -

March 2002

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