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 km^2, 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.

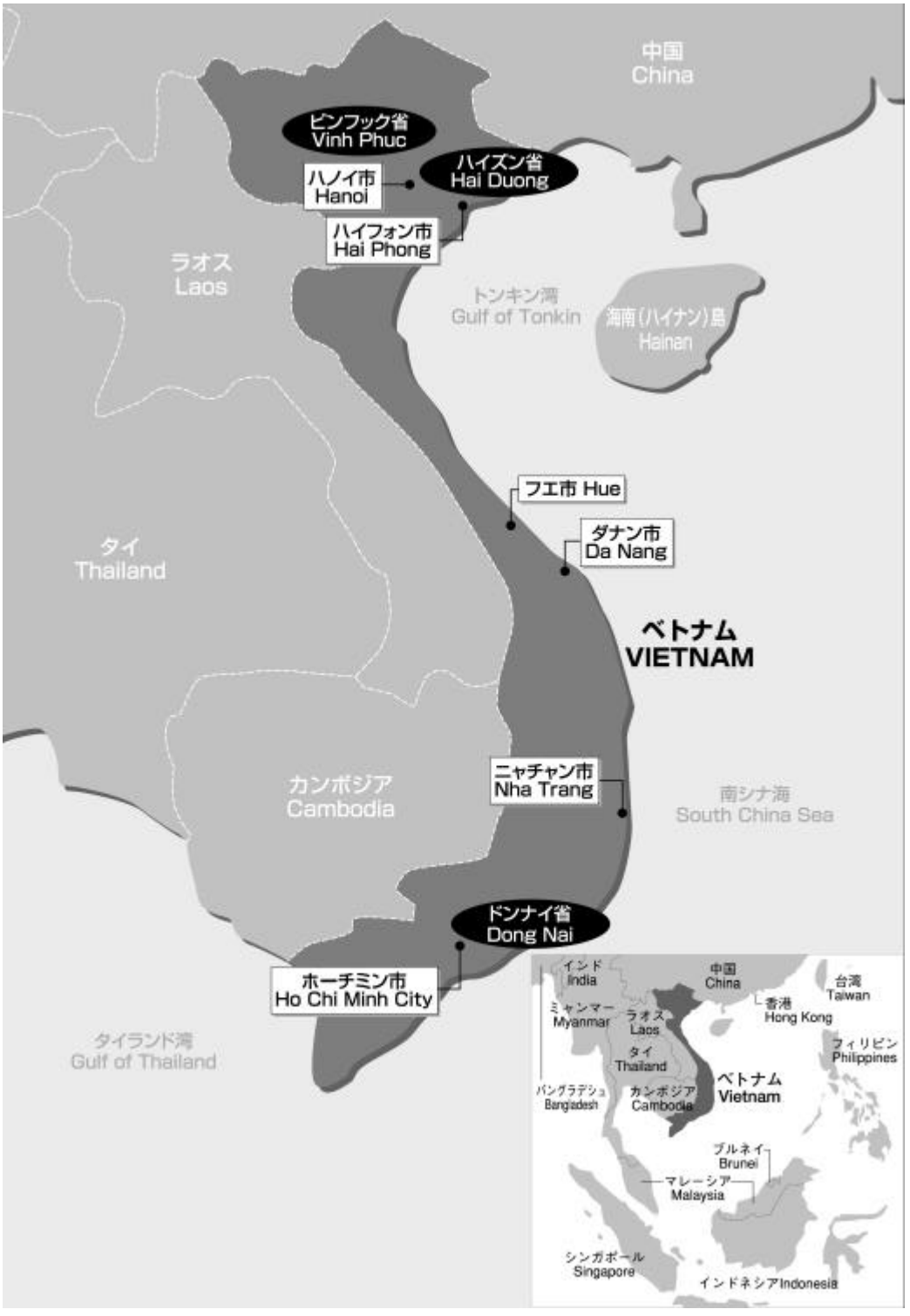
Since around 1989, when the *Doimoi* policy started to have effects, Vietnam has achieved stable, high economic growth through encouraging investment by foreign countries and promoting industrialization. In fact, around 1995, led by rapid economic growth in neighboring Southeast Asian countries, lots 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), NOx (nitrogen oxides), HC (hydrocarbons), SO_2 (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/m^3 for soot and dust, far higher than the central government's environmental standard; and 0.03mg/m^3 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.

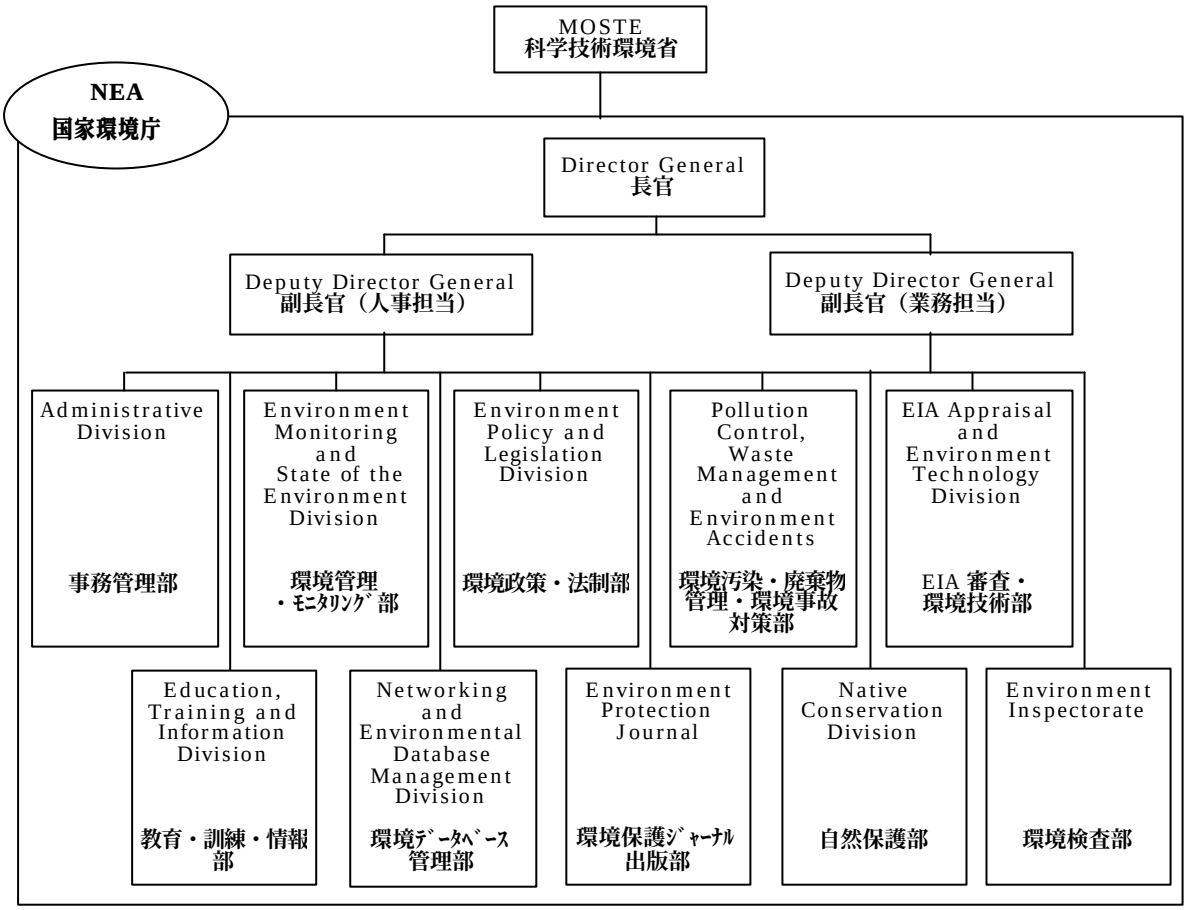
In Vietnam, the Ministry of Industry (MOI), into which the former Ministries of Heavy Industries, Light Industry and Energy were integrated in 1995, plays a part in dealing with environmental problems, mainly directing the state-owned enterprises to take measures against industrial pollution. Under the 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-BKHCNMT) issued by the Ministry of Science, Technology and Environment (MOSTE) in April 1998. This Circular No.490/1998/TT-BKHCNMT 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-BKHCNMT.

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-BKHCNMT) **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-BKHCNMT）
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-BKHCNMT).

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

When a project falls under Category Ⅱ, 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 Ⅰ (projects of large environmental impact) as specified in the Circular No.490/1998/TT-BKHCNMT, 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 Ⅱ, 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)

		National Standards			
Parameter \ Country		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	BOD5 (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 (**VI**)/**６価クロム**	0.05	0.1	0.5	0.5
18	Chromium (**III**)/**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 α activity/ **全アルファ線強度** (Bq/l)	0.1	0.1	--	-
33	Gross β 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) (NH_3-N × 0.4 + NO_2-N + NO_3-N) ≦ 100mg/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), NO_2 (nitrogen dioxide), SO_2 (sulfur dioxide), lead, O_3 (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 NOx (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 (SO_2) is set at 1,500mg/m^3 under Category A and 500mg/m^3 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/m^3 (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 (NOx) is set at 1,000mg/m^3 (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 NOx. 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 NOx 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/m^3 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

		National Standards		
		Vietnam(TCVN 5939-1995)		Japan[3]
Parameter \ Country		A[1]	B[2]	
1	Particulate in smoke of:			
	- heating of metals	400	200	30 - 250[4]
	- 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_2S/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_2SO_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 Management[1)]

Classification			Criteria		Treatment or Disposal Measures									
					Recovery		Physical/Chemical Treatment				Incinera-tion		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 congenor 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-BKHCNMT).

This Circular Letter first divides investment projects into Category Ⅰ, projects having marked environmental impact; and Category Ⅱ, other projects. When a project falls under Category Ⅰ, it then requires the entity implementing the project to prepare a full-fledged environment impact assessment report, while, for Category Ⅱ, 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-BKHCNMT) 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 Ⅰ lists 25 types of applicable projects and their applicable sizes.

For a project classified as Category Ⅰ 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-BKHCNMT) carries the provision that if any project under Category Ⅰ 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 Ⅱ 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 Ⅱ, 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-BKHCNMT). 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 Ⅱ, 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.