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Foreword

MEIP: the Context for the Study

The UNDP-assisted, World Bank-executed Metropolitan Environmental Improvement Program (MEIP) began work in 1990 in five Asian metropolitan areas—Beijing, Bombay, Colombo, Jakarta, and Metro Manila. In 1993, this intercountry program began its second phase and Kathmandu joined as the sixth MEIP city. MEIP is a constituent partner of the UNDP Urban Management Program for Asia and the Pacific (UMPAP).

MEIP's mission is to assist Asian urban areas tackle their rapidly growing environmental problems. The MEIP approach emphasizes the cross-sectoral nature of these problems and address the failure of traditional, sectoral development strategies to adequately address urban environmental deterioration or the linkage between industrial and urban development.

The work program in each city is therefore guided by Steering Committees and technical working groups that reflect the cross-sectoral, interagency nature of urban environmental issues. The policy and technical committees develop Environmental Management Strategies (EMS) for their metropolitan regions; incorporate environmental considerations into the work of economic and planning agencies; contribute to the strengthening of environmental protection institutions; and identify high priority environmental investments.

The MEIP city office serves as secretariat to the Steering Committee and is managed by a local environmental professional, the National Program Coordinator (NPC). The NPC coordinates all MEIP activities and is responsible for developing the environmental network of government, private sector, non-governmental organizations (NGOs), research institutions, and communities. MEIP supports workshops, demonstration projects, and community environmental actions, and links these growing environmental network efforts with government policy and investment initiatives.

A further focus of MEIP is the exchange of experience and sharing of information among MEIP cities. This has been carried out through a series of intercountry workshops that review the city work programs, exchange useful experience, and develop intercountry projects.

MEIP has established the city programs, set in motion a variety of city subprojects, and mobilized the intercountry exchange. MEIP publications are intended to share insights and experiences developed from the MEIP process and its projects. The six MEIP city programs work independently, with each other, and with international partners to reverse urban environmental degradation and provide useful and replicable lessons in urban environmental management.

MEIP and Urban Environmental Management Experience in Japan

To assist developing countries strengthen institutional capacity to control pollution and manage environmental resources, learning from countries and cities that have experienced similar problems is a particularly effective tool.

Japan has had a large measure of success in dealing with environmental problems associated with rapid industrialization and urbanization. As a developed country in Asia, its urban environmental management history affords an excellent opportunity to derive lessons and case studies.

This study undertakes a detailed review of Japan's experience in urban environmental protection and clean-up. The focus was to elaborate experiences of particular relevance to MEIP cities, and to other cities in Asia and elsewhere in the developing world.

The report's review of national experience also makes extensive use of material derived from the concurrently conducted case studies of three metropolitan cities — Yokohama, Osaka, and Kitakyushu. (These cases are summarized in the Annexes and published by MEIP as companion volumes to this report.)

Some useful conclusions concerning the applicability of Japan's experience for developing countries can be drawn. The study demonstrates that, while much of the technology and present management practice may not be easily transferrable, the way in which Japan tackled pressing environmental problems during the 1960s and '70s is directly relevant to the environmental management challenge facing MEIP cities.

On behalf of the MEIP team, I would like to express appreciation to Shunsuke Aoyama and his colleagues at EX Corporation for their superb efforts in conducting the study. We are especially grateful to the report's principal authors, Mr. Aoyoma, Jeremy J. Warford, Kiichiro Sakaguchi, Nahoko Nakazawa, and Hiroshi Naito for their exacting work and careful analysis. Profound thanks are due to Professor Michio Hashimoto, Chairman, and to the other members of the Steering Committees at both national and local levels. Finally, we are indebted to the Government of Japan for the support that enabled us to undertake this project and to the unflagging efforts of Kazuhiko Takemoto of the Japan Environment Agency and of Katsunori Suzuki, our colleague at MEIP-World Bank.

David G. Williams

Program Manager

Metropolitan Environmental Improvement Program

Preface

This study comprises Japan's experience in handling urban environmental issues, with special emphasis upon developments since the end of the second world war. Like all countries, Japan has its own unique characteristics, not least of which has been its phenomenal rate of economic growth in recent years. Nevertheless, its efforts to deal with urban environmental problems, many of which stem from the process of economic growth itself, may afford valuable lessons for cities in developing countries, not only in the Asian region, but throughout the world.

The study is comprised of two main elements. The first one, contained in this report, consists of an overview of Japan's experience, and draws general conclusions about the relevance of this experience for developing countries. More detailed treatment of the Japanese experience is contained in the second element of the study, which consists of three city case studies conducted in Kitakyushu, Osaka, and Yokohama, which are among the largest cities in Japan. The overall study draws upon, but is not restricted to, the material from the city studies.

The work has been conducted by staff of EX Corporation, under the direction of its President, Mr. Shunsuke Aoyama, and guided by a Central Steering Committee under the chairmanship of Dr. Michio Hashimoto. Three local advisory committees were also established in close collaboration with the case study cities. The central committee consisted of senior environmental experts, representatives of the local committees, and senior staff of concerned government agencies. Each local committee included senior environmental experts and staff of the Environmental Protection Bureaus (EPBs) and related departments in the city. The case studies are presented in a separate, companion volume to this one, entitled: *Urban Environmental Management in Japan: The Experience of Yokohama, Osaka and Kitakyushu.*[1] A brief summary of the case study report is contained in Annex 1. Major sources of information and data for the study are the reports annually prepared by the Environment Agency of Japan entitled *Quality of the Environment in Japan,* from which many figures and tables have been drawn.

The study forms part of the World Bank-UNDP Metropolitan Environmental Improvement Program (MEIP), which is a collaborative effort, aimed at improving urban environmental management, and facilitating appropriate investments in major cities in Asian developing countries. The current study gained much from interaction with other members of the MEIP, primarily at two international events. The first of these was the Intercountry MEIP Workshop in Colombo, Sri Lanka in December 1992, at which time an interim report of the study was presented and discussed. The second was a study tour in Japan (see Annex 2, Program of MEIP Japan Study Tour) which was attended by officials from the MEIP cities as well as other developing country participants and staff of concerned international organizations, and which culminated in the Conference on Urban Environmental Management in Asia, held in Kitakyushu in October 1993. This conference was jointly sponsored by the City of Kitakyushu, the World Bank, UNDP, and the United Nations

Center for Regional Development. A major objective of these meetings was to determine how Japanese environmental experience can be used to help cities in developing countries tackle their own environmental problems.

Authors of this report are Shunsuke Aoyama, Jeremy J. Warford, Kiichiro Sakaguchi, Nahoko Nakazawa, Hiroshi Naito and other staff of EX Corporation, Tokyo.

Note:

[1] This document is referred to as Case Studies in the following text.

Chapter 1: Environmental Issues Prior to the Basic Law

This chapter begins with a brief outline of the general geographical and historical background relevant to the development of environmental concern and policy in Japan. The chapter is mainly concerned with the evolution of government environmental policy, citizens' movements and legal developments, as well as trends in environmental conditions up to around 1967, this being the date at which landmark legislation, namely the Basic Law for Environmental Pollution Control, was passed.

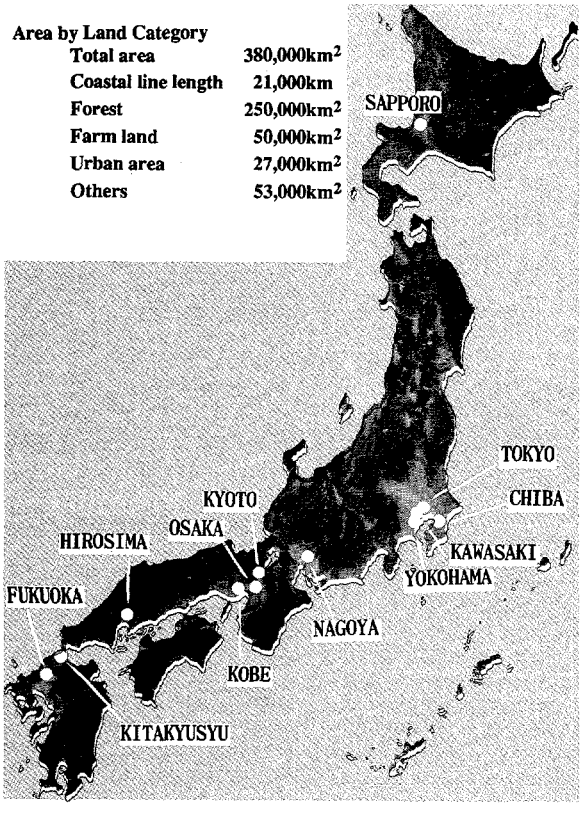


Figure 1.1: Japan: Major Industrial Cities and Areas

Geographical and Historical Background

Japan has a land area of 378,000 square kilometers, and is surrounded by ocean. The map of Japan (Figure 1.1) shows all cities with populations in excess of one million, among which are the three cities selected for special study in this exercise, namely, Yokohama, Osaka and Kitakyushu. Although not a large country, Japan extends between the latitudes of 20 and 45 degrees north, and encompasses a wide variety of climatic conditions, ways of life, and natural resources.

A great trading nation, Japan nevertheless continues to possess an insular individuality, and while importing foreign technologies and cultures, invariably molds them to its own style. Except for the period when it was temporarily occupied by the Allied Forces after World War II, Japan has not been invaded by other countries since prehistory; indeed, it closed its doors completely to foreigners for 300 years, this period of isolation ending in the 1860's. During this time its economy and culture developed into a system based upon agriculture and primary industry. After the samurai-centered feudal society was dissolved 130 years ago, a form of democracy was introduced under the Emperor; for about 80 years after that until Japan's defeat in World War II, national policies, especially those for enhancing the wealth and military strength of the country, were promoted, with the military and the "zaibatsu", or industrial combines, as the key players.

In accordance with this policy, heavy industries such as steel manufacture were developed in the Keihin, Hanshin, Chukyo, and Kitakyushu economic areas, and a network of national trunk roads and railroads was created. (See Annex 3, Transportation Networks and Land Use in Japan.) These

investments stimulated heavy rural to urban migration.

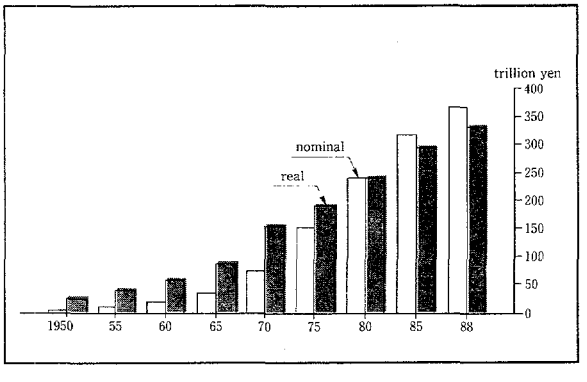
Serious environmental problems were associated with these changes in the country's economic structure. Rapid industrialization brought with it air and water pollution, poor working conditions, and mineral poisoning (exemplified by the Ashio copper mine case), but industrial growth, necessary to promote the military strength and wealth of the country, took precedence over these problems. The environmental damage and ill-health caused by industrial pollution were ignored by government for many years. There were however some positive developments during this period; these included the introduction of primary education for all, and improved urban water supply and sanitation measures. Improved night soil collection and liquid waste disposal, essential for the promotion of public health, were given high priority.

Following World War II, a number of developments created conditions favorable to environmental improvement in Japan. These included the dissolution of the system dominated by the military, financial and large landowning classes. Political and economic repression was abolished, and farmers and workers became able to participate in the political process, and to articulate their concerns about all matters, including environment. The system of election by the people of local government leaders, the Diet and the district assembly was established, and the basic conditions for people to reflect their opinions in legislative district administration were secured. This process also involved a significant shift of governmental responsibility from the center to municipal and local governments. Paralleling these developments, educational opportunity became more democratic, and more widely available.

In the immediate post-war period, reconstruction of public and industrial infrastructure, food production (agriculture and fisheries) and housing construction were top priorities. Housing construction placed great demands on wood supplies, and resulted during this period in considerable deforestation in the country. Secondary industry in Japan began to be restored during the Korean War, which broke out in 1950; by 1951 increased demand generated in part by this conflict stimulated levels of production in mining and manufacturing industries and real personal consumption had regained their pre-war levels. Since then, Japan's rate of economic growth has been extremely rapid; its GNP exceeded that of Germany by 1969; and it is now the second largest economic power in the world (see Figures 1.2 and 1.3.)

Not only the total volume, but also the structure, of the Japanese economy has changed significantly over the post-war period. As Figure 1.4 demonstrates, the share of primary industry, in terms of value added, has declined,

Figure 1.2: Japanese GNP 1950-1988



Note:
At 1980 prices

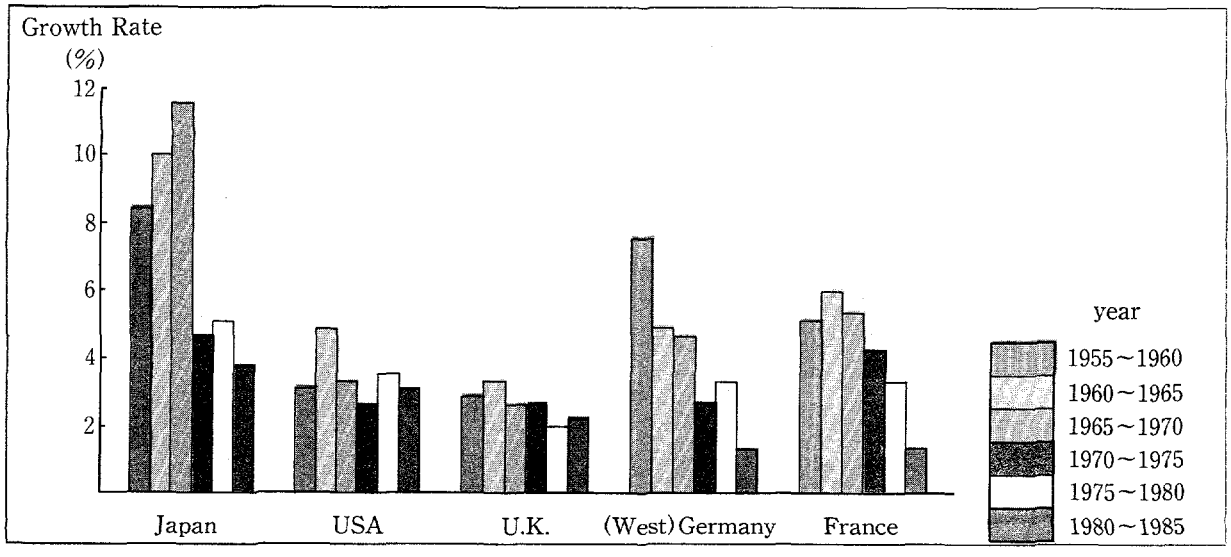


Figure 1.3 : Average Annual Growth in GNP Major Countries 1955-1985

being replaced mainly by tertiary industry. Primary industry's share of GNP fell from 25% of total value added to less than 5% during this period, while its labor force decreased from 18.6 million in 1950 (52.0% of total labor force) to 4.5 million (7.3%) in 1990 (see Figure 1.5).

Paralleling these changes, while the total population of Japan increased from 83 million in 1950 to 103 million in 1970, 117 million in 1980, and 123 million in 1990, the urban population figures were 40 million in 1970, 72 million in 1980, and 79 million in 1990 respectively. Clearly, these changes in industrial structure and population movements have had substantial implications for the environment.

Table 1.1 lists the amount of land used for various purposes in Japan. Land designated for forest (about two thirds of the total land area of the country) and agriculture is roughly the same as that which prevailed at the end of the feudal period in the 1860s. Despite the rapid growth in demand for residential land to meet the needs of the increasing population and industries, land designated for these purposes still accounts for only about 5% of the national land area. One consequence of this has been that urban land values have escalated to levels that are unmatched elsewhere in the world. However, completion of the agricultural land designation before the modernization period greatly contributed to conservation of the natural environment in Japan during the process of urbanization and industrialization.

Environmental Consequences of Rapid Industrial Growth

Since as early as 1900, there have been many complaints about the quality of the environment in Japan. Air pollution, consisting of offensive and toxic gas, soot and smoke were clearly starting to damage the well-being of the population well before World War II. Even at this early stage, citizens' movements led to lawsuits concerning pollution, (summarized in Annex 4 Anti-Pollution Activities by Citizens'

Groups, 1890-1975). The Tokyo Hygiene Laboratory started measuring dust fall in 1927 and at that time observed 18 tons of dust per square km/month at the center of the city.[1] This origi-

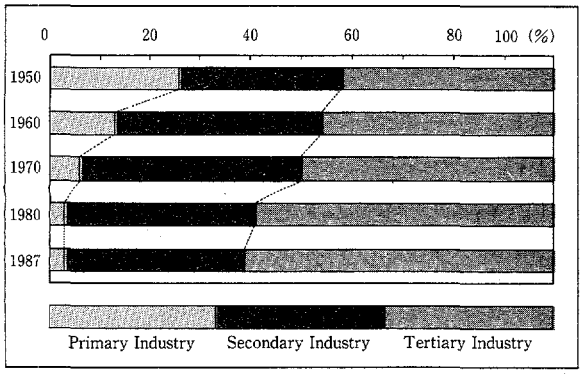


Figure 1.4: Industrial Structure (Share of GNP) 1950-198

Source: Economic Planning Agency

nated from road particulates (exhaust gas and clouds of dust from unpaved roads), and emissions from small and medium sized enterprises such as gas, tannery, foundry, food processing, and spinning industries. Most air pollution was referred to as "neighborhood pollution", since it was mainly caused by factories located close to residential neighborhoods.

Militarism during the Showa Era (from 1926) promoted the construction of large factories such as those in the steel and chemical industries, which caused large-scale air pollution. Noise and vibration also became of increasing importance,

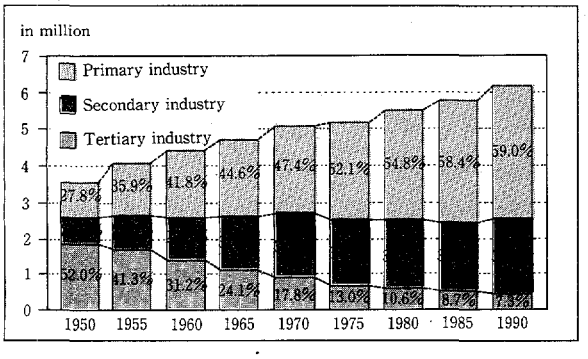


Figure 1.5: Changes in Industrial Labor Force 1950-1990

and constituted the vast majority of complaints by citizens about environmental matters. Under this administration, the introduction of measures to counter factory pollution were discouraged. Furthermore, after the China Incident of 1937, the centrally planned and controlled economic and war policies exacerbated industrial pollution on the populace. The expansion of the war industry increased pollution, but despite an increasing amount of attention to this subject in the House of Representatives, (see Annex 5, *Pollution Problems Discussed in the House of Representatives*), the government largely ignored the problem until the war ended.

The post-war reconstruction period, and the emergency demands due to the Korean War, brought about economic prosperity. Japan then entered into its national industrialization period and designated new industrial cities and special industrial areas. During the next 20 years, air and water pollution seriously worsened. Until the latter half of the 1950s, residential areas in many large cities had high factory densities, and air pollution originating from small and medium-sized factories also became widespread. The number of factories in Tokyo was 47,300 in 1955, which was almost double that of 24,900 in 1928, and constituted 10% of the national total. Approximately 40% of these factories had less than four workers. Air quality in Tokyo in the mid-1960s was particularly poor. SO_2 and NO_2 levels reached their peak at that time. As Figure 1.6 shows, subsequently there has been general improvement in all indicators.

By the late 1960s, the quality of rivers and lakes had also begun to deteriorate significantly. A rough indication of water quality conditions is

Area (in ten thousands of hectares)						
	1963		1972		1989	
Type of Land Use	**Area**	**%**	**Area**	**%**	**Area**	**%**
Agriculture	655	17.4	596	15.8	538	14.2
Forest	2,508	66.5	2,529	67.0	2,526	66.9
Plain	66	1.8	49	1.3	28	0.7
Lakes and Rivers	111	2.9	127	3.4	132	3.5
Roads	79	2.1	83	2.2	113	3.0
Housing	64	1.7	70	1.9	97	2.6
Industrial/Commerce	14	0.4	40	1.0	62	1.6
Others	272	7.2	281	7.0	281	7.4
Total	3,769	100.0	3,774	100.3	3,777	100.0

Table 1.1: Land Use In Japan

Source: "A White Paper for Lands" and " A Summary for Statistics of Lands", published by the National Land Agency

demonstrated in Figure 1.7 which shows the BOD (biochemical oxygen demand) densities of major rivers in Tokyo Prefecture in 1969. In many of the tributaries of these rivers, the density was in excess of 30 ppm, and the DO (dissolved oxygen) of the major rivers was often only 1-2 ppm.

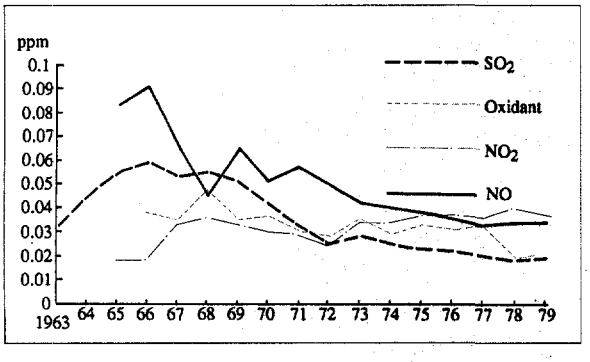
Complaints about noise continued to grow during this period, with the spread of radios and phonographs, the automobile, and high speed railways exacerbating the problem. By 1949, 70% of citizens' complaints about the environment concerned noise pollution. Still more problems arose from the introduction of jet aircraft and construction of the international airports. In the late 1960s, noise nuisance from international airports and defense facilities came to be treated as a general social problem, since urbanization expanded around the airports. In some cases, residents around the airports undertook lawsuits aimed at prohibiting airport operations at night, and to claim compensation.

High speed railways started to become a major source of complaint with regard to noise and vibration. The "Tokaido Shinkansen" super-express train between Tokyo and Osaka started operations in October, 1964. Though "Shinkansen" was designed and developed by using the most modern technology with respect to velocity, safety and operational economics, its effect on residents' living environment was not taken into account.

The following figures show how the number of pollution complaints in Tokyo changed during the pre and post-war periods. Figure 1.8 refers to total number of complaints about industrial pollution between 1924 and 1936 [2] : these were primarily about noise and vibration, followed by air pollution. Table 1.9 shows that noise and vibration continued to be of dominant importance after the Second World War. However, trends over time are perhaps more useful than comparisons between different types of pollution. Indeed, the number of complaints nation-wide continued to increase for some years, increasing from about 20 thousand in 1960, to 65 thousand by 1970 (it has stayed at about this level ever since).

Most of the complaints related to emissions from small and medium-sized factories.

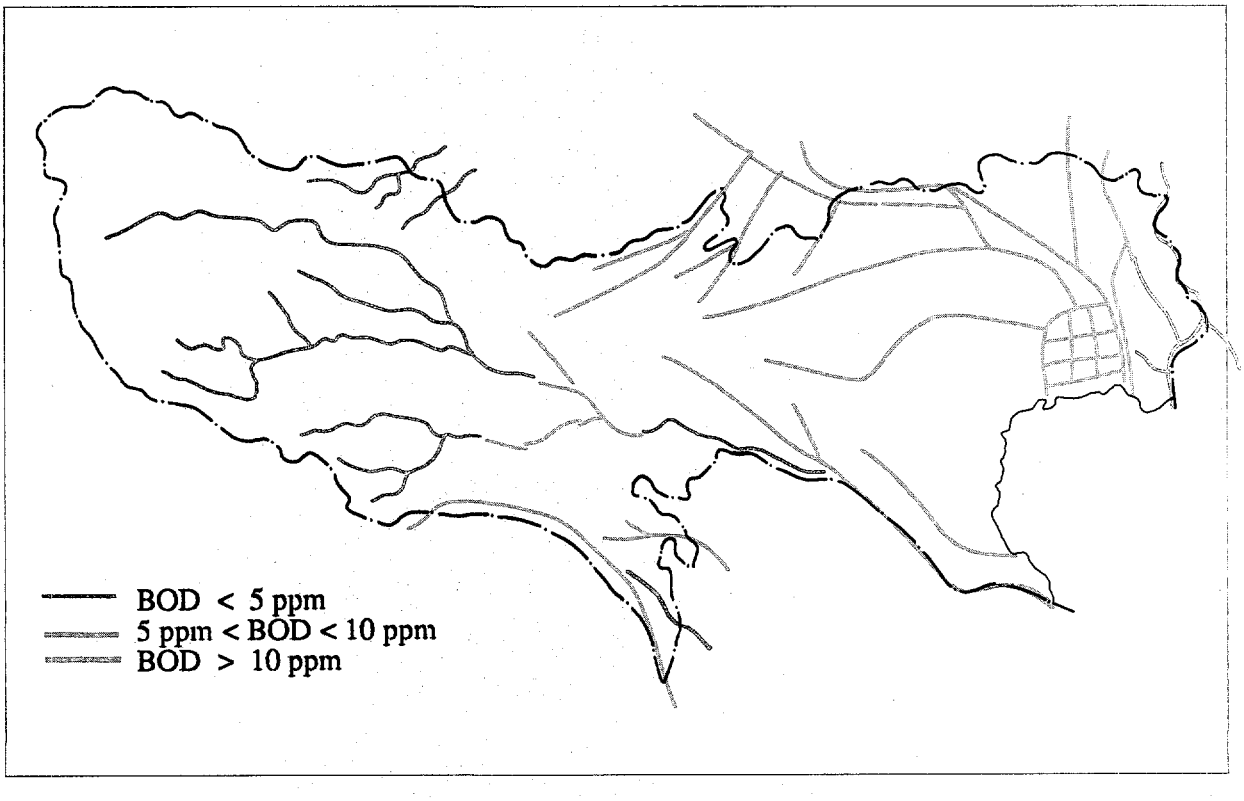
Figure 1.6:
Air Pollution Trends in Tokyo 1963-79
(Annual average concentrations)



Metal, machinery, chemical, ceramic, and spinning industries were the primary source of these complaints.

After 1960, the Korean War expanded industrial demands dramatically, and this stimulated the construction of large-scale steel and petrochemical complexes. Severe air pollution originated from these complexes as well as from thermal electric power plants. City-wide air pollution caused by the steel and petrochemical complexes (in Yokohama-shi, Kitakyushu-shi, Chiba coastal area complexes, Yokkaichi-shi, etc), as well as by small and medium-sized factories and by heating of buildings, was widespread. Indeed, air pollution in Japan was at its worst in this period. This stimulated a series of legislative and regulatory initiatives, primarily at the local government level. In 1964, another initiative with far-reaching consequences was taken; this was the Pollution Control Agreement (referred to below [3]) between the City of Yokohama and the Isogo Coal Thermal Electric Power Plant. This important milestone set a precedent for other agreements (now numbering more than 37,000) nationwide, in which local voluntary agreements arrive at standards that are higher than the national ones. Finally, the Basic Law for

Figure 1.7:
Water Quality of Major Rivers in Tokyo Prefecture (1969)



Source: "Pollution and Tokyo", Tokyo Research Institute for Pollution Control

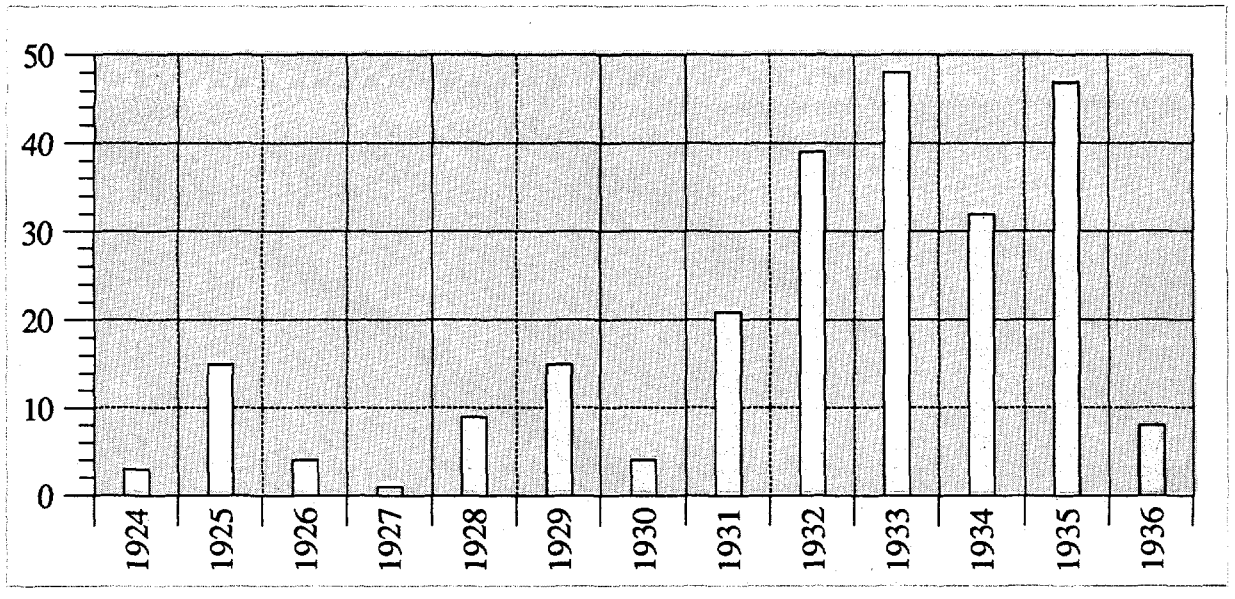


Figure 1.8: Complaints about Industrial Pollution in Tokyo, 1924-36

Source: Tokyo Metropolitan Government

Environmental Pollution Control was enacted in 1967.

Government Initiatives Prior to the Basic Law

Although, as described below, local governments had traditionally exercised responsibility for urban sanitation since feudal times, one of the earliest efforts on the part of government to address pollution issues was that of the city of Osaka, which, in 1888 issued an ordinance banning the construction of factories with smokestacks within the old Osaka city. During the Meiji Era (1868-1911), large cities such as Tokyo and Osaka started to respond to growing numbers of labor accidents and problems stemming from inadequate hygiene, taking a number of measures in the 1880's and 1890's which regulated factory location and operations.

At the national level, the River Law was established in 1896. This act was the first to introduce the term "pollution", although water pollution was actually an incidental issue. The Mining Law was issued in 1905 and the Factories Law in 1911. The Factories Law stated that when a factory or facility endangered or damaged public health and interest, the administrative agencies should order the factory owner to control or remove pollution. In case of necessity, the agencies could stop a total or partial operation of the factory or facility. However, because the main objective of the Factories Law was protection of labor, it was not very effective in regulating emissions of pollutants. The legal system related to mining has been reorganized and developed since World War II. Environmental pollution caused by mining operations has been addressed in the following laws.

(a) Mine Safety Law (1949): This basic law focuses on the protection of workers in mines. The law confirms the following elements:

Obligation of mine pollution prevention, such obligation to be maintained upon the

Table 1.2: Total Number of Complaints about Industrial Pollution in Tokyo, 1949-59

Pollution	Total	Share of Total (%)	Noise	Vibration	Toxic Gas	Waste Water	Dust	Smoke	Other
Total (%)	6062 100.0	- 100.0	3323 54.8	747 12.5	729 12.0	98 1.6	360 5.9	542 8.9	263 4.3
Metal	1886	31.1	1102	249	219	28	102	152	34
Machinery	919	15.2	663	140	38	6	21	32	19
Chemecal	825	13.7	197	55	333	48	47	121	24
Electricity Gas	102	1.7	63	9	17	3	3	6	1
Ceramics	253	4.2	121	22	9	0	36	58	7
Textile	224	3.8	72	15	11	2	83	35	6
Sawmill	411	6.5	335	26	7	0	22	8	2
Foods	401	6.5	214	41	36	5	12	88	5
Printing	487	8.0	328	126	18	0	2	5	8
Others	565	9.3	228	64	41	4	32	37	157

transfer of mining rights;

■ Obligation to report on mine pollution prevention plans; and

■ Pollution prevention measures to be taken after a lapse of mining rights (the order can be issued during 5 years after the lapse of mining rights)

(b) Amended Mining Law (1950): This law contains the following:.

■ Obligation to provide compensation for mine pollution damages; and

■ Deposit system in order to create a compensation fund (a fixed amount ton of per coal production must be deposited)

(c) Temporary Law for Coal Mine Damage Rehabilitation (1952),

(d) Coal Mine Damage Compensation Temporary Law (1963), and

(e) Special Law for Mining, Pollution Control in Metal Mining Industries, etc. (1973): These three laws contain the following regulations.

■ Establishment of long-term planning of rehabilitation of mine damages caused by coal and other mining;

■ Implementation of rehabilitation works by the organizations established by national government (Coal Mine Damage Corporation and Metal Mining Agency of Japan); and

■ Creation of a reserve fund and payment system to the above organizations by mining right owners.

The mining related laws in Japan have followed the regulation of liability without fault in the Mining Law of the Meiji Era. The laws establish responsibility for pollution damage compensation. They further stipulate that rehabilitation in the case of mine pollution should be secured by a reserve fund funded by holders of mining rights and national subsidy.

During the Taisho Era (1912-1925), the Urban District Building Law, currently known as the Building Standard Law, was passed. Although this law, enacted in 1919, did not regulate pollution directly, it designated industrial areas and contributed to environmental protection by separating residences from dangerous factories. During the subsequent Showa Era, the population and number of industrial plants in large cities

such as Tokyo increased dramatically, and more factory regulations were introduced. The Tokyo government enacted the Factory Regulation in 1929, this being subsequently revised in 1937 and again in 1943. This regulation controlled factory construction through a license system, protected personal property and safety, and regulated noise, vibration, offensive and toxic gas, and waste water. This became a model for the Tokyo Municipal Factory Pollution Prevention Ordinance established after World War II. The 1943 revision of the regulation introduced the word "factory pollution" for the first time, and stipulated pollution prevention as one of its objectives.

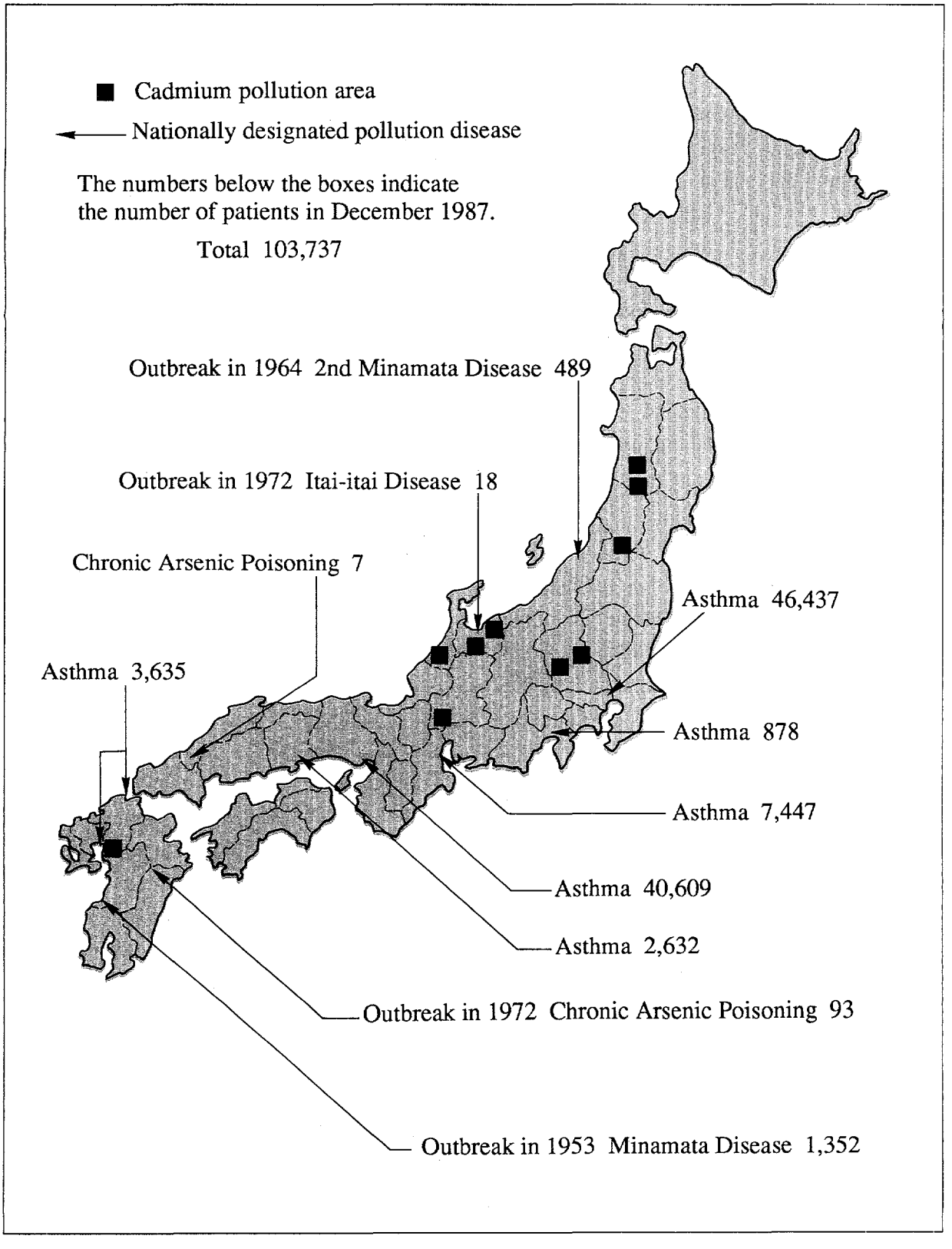
In 1932, the Osaka government issued the Soot and Smoke Prevention Regulation. Industrial pollution countermeasures in other large cities were also gradually expanded. Generally, however, measures to address neighborhood pollution, in particular factory relocation, moved slowly. Furthermore, as indicated above, the China Incident of 1937 and the controlled economic policy gave clear priority to industrial production.

The Water Quality Conservation Law of 1958 and the Factory Effluent Control Law of 1958 were the first laws to specifically address pollution at the national level. However, neither law included the designation of water areas or the establishment of water quality standards. These did not materialize until the designation of the Edo River in 1962. With regard to air pollution, designation of areas and standards did not appear until the Smoke and Soot Regulatory Law of 1962. Municipal governments, led by Tokyo, Yokohama, and Osaka took the leadership role during this period.[4] This is illustrated in Annex 6, *Pollution Control Measures Taken by the Tokyo Municipal Government in the Post-War Years.*

With regard to noise and vibration, the Tokyo Metropolitan Police Office established a Loud Tone Regulation in 1937. In 1943, the Tokyo metropolitan government enacted the Regulation on the Prevention of Pollution and Accidents in Factories. By this regulation, the government tried to prevent public nuisances and disasters stemming from factories by controlling factory location and maintaining adequate distance between factories and residential areas. After World War II, the Tokyo Metropolitan Government introduced a Factory Pollution Prevention Ordinance to prevent public nuisances. This ordinance regulated not only dust, soot and smoke, but also noise and vibration. Building or rebuilding factories required the permission of the local governor, and in the case of rebuilding, facilities had to be improved in line with the requirements of the ordinance. In 1954, street noise caused by commercial advertising led to the Noise Prevention Ordinance, which established standards for the loudness of public address equipment. Other local governments enacted similar ordinances during this period. Measures addressing noise pollution before the 1960s, however, only applied to fixed point sources.

Until the mid-1950s, public health at the national level in Japan had focused mainly on the prevention of contagious diseases such as tuberculosis, by providing basic sanitation, garbage collection, sewage disposal, and promotion of labor hygiene. In low income areas there were still common lavatories and com-

Figure 1.9: Places Where Environmental Pollution Caused Serious Health Damage



Source: Japan Environment Agency

mon wells provided by local governments. Except for such public sanitary activities, there were few policies on water pollution, and urban rivers become in effect open sewers, receiving household and factory effluents.

However, industrial pollution was becoming recognized as an increasingly important threat to human health. The Morinaga arsenic milk incident (1955) involving parathion toxication of agricultural chemicals was widely publicized. The press then publicized a hitherto unknown disease at Minamata. This was a period when pollution, while often latent, was expanding rapidly. In the latter half of the 1950s, frequent smog warnings, and noise associated with industry and transportation started to create health problems in large cities.

In 1953, the Ministry of Health and Welfare (MHW) investigated the number of cases of air and water pollution, noise, and vibration, and damages suffered by the population on a national scale. In 1954, the Ministry also consulted with the Japan Public Health Society on desirable environmental pollution control standards. Based on the result of this consultation, the Ministry then (1955) tried to submit a bill entitled the Living Environmental Pollution Control Standards Law. However, the Ministry failed to submit it because other concerned ministries, local governments, and industries concluded that the timing was premature, and successfully opposed it.

In 1959, the Factory Waste Water Regulatory Law was established as a direct result of fishermen breaking into the Edogawa Honshu Paper Manufacturing Company to protest against the discharge of factory waste water into the Edo River. Effluent standards were determined by the Economic Planning Agency, but actual implementation was hampered by complex bureaucratic requirements involving five ministries. However, in 1970, laws concerned with water quality regulation such as the Prevention of Marine Pollution and Maritime Disaster Law and the Water Pollution Control Law were established. The Sewerage Law and Poisonous and Deleterious Substances Control Law were also revised.

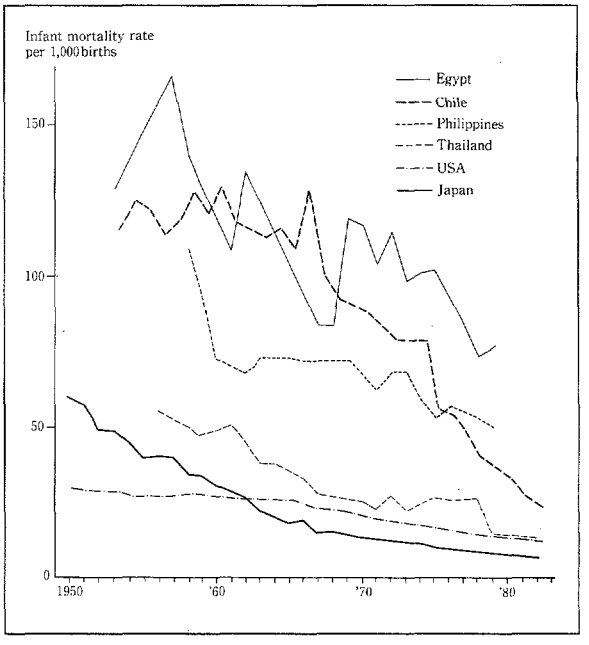


Figure 1.10: International Comparison of Infant Mortality Rates 1950-80

Source: Ministry of Health and Welfare

In 1956, due to increasing incidents of land subsidence, the regulation on the pumping of underground water for industry was upgraded to a Law. In 1960, the public health division of the environmental sanitation bureau at the Ministry of Health and Welfare (MHW), which was responsible for environmental sanitation, initiated measures for pollution administration at the national level.

In 1961, the MHW and the Ministry of International Trade and Industry (MITI) pre-

pared a bill which culminated in the Soot and Smoke Regulatory Law. They agreed that: 1) both ministries had responsibility relating to the soot and smoke regulation, (MITI being responsible for pollution sources, MHW for environmental aspects and impacts; 2) the bill should contain general inspection and emergency measures; 3) the bill should establish regulations based on the relative emission concentration method; 4) the bill should not include a preventive regulation for new sources of pollution; 5) the bill should not include exhaust gas regulation; and 6) the objective of the bill should include a phrase, "preserving the national health and protecting the living environment which harmonizes with healthy economic development". Although the Diet passed the bill in 1962, public opinion as well as the mass media referred to it as "toothless".

The Soot and Smoke Regulatory Law created legal controversy over the relationship between existing local ordinances and the new law. The MHW, MITI, and Ministry of Home Affairs (MHA) then revised the law to accept local ordinances. At this time, the petrochemical complexes in Yokkaichi and other sites started their operations, and public complaints and many cases of asthma-like disease were reported. The SOx automatic measurement equipment, which was installed at Yokkaichi in 1962 frequently recorded almost 1 ppm.

The Mie University in Mie prefecture continuously conducted epidemiological research on the correlation between air pollution and asthma-like cases, and found that more than 0.2 ppm of SOx concentration drastically increased the number of asthma cases. In 1964 the Kurokawa Commission, which consisted of top ranking specialists in the fields of metrology, urban planning, factory location, combustion technology, factory safety, environmental science, labor hygiene, and public health, and which was sent by the MHW and the MITI to Yokkaichi, made a series of important strategic recommendations. These included: conversion to low sulfur fuel, spreading emissions by tall smokestacks, and introducing pollution control facilities; the use of common facilities in complexes as a pollution control mechanism; a holistic approach to pollution control in complexes, including city remodeling, health care, and work safety; and special health care services to reflect the correlation between asthma cases and the existence of SOx at the level of 0.2 ppm concentration. The University of Mie findings and the Kurokawa Commission recommendations had great influence on subsequent air pollution policy.

Paralleling these developments, the administrative structure started to change at the national level. In 1963 the MITI created an industrial pollution division, and an Industrial Pollution Committee in the Industrial Structure Council[4], and developed pollution control measures to be implemented by industry. The MHW created the pollution division in the hygiene bureau in 1964 and also established an Environmental Pollution Council. Also, in 1964, both Houses of the Diet introduced a special committee for industrial pollution control which provided an on-going opportunity to discuss relevant environmental problems. The

Environmental Pollution Control Service Corporation (now the Japan Environment Corporation) was also established. The Corporation aimed at developing technology for investment in plant and equipment, and assisting in providing finance for pollution control. The Corporation has played a critical role in stimulating pollution control activities among small and medium-sized enterprises, and continues to do so (its activities are described in more detail in Chapters 3 and 5).

Residents' Movements and Pollution Litigation

Citizens' protest movements against industrial pollution have a long but intermittent history. One of the earliest examples was by the residents of Yatani Village who suffered from toxic wastes emitted by the Ashio copper mine in the 1890s. This was a major milestone in which the citizens' grievances were taken seriously by the courts, with major steps taken to address them.

Although pollution complaints and litigation were common in the succeeding years, there was considerable time before they became important political or social issues on a national scale. First, residents, factories and local governments began to participate in joint efforts to address major problems, often in an informal way. Second, although anti-pollution movements (including farmers, fishermen, and urban residents) became widespread, real political power lay in the hands of the main culprit, i.e., the mining and manufacturing industry which was central to the government's policy of enhancing the military and industrial strength of Japan. Such industries were also very profitable, and were able to deal with complaints by providing compensation, rather than taking dramatic pollution abatement measures. Pollution litigation before the war was limited to small scale neighborhood suits for damages, and never developed sufficiently to influence environmental policy at the national level. The time necessary for legal proceedings

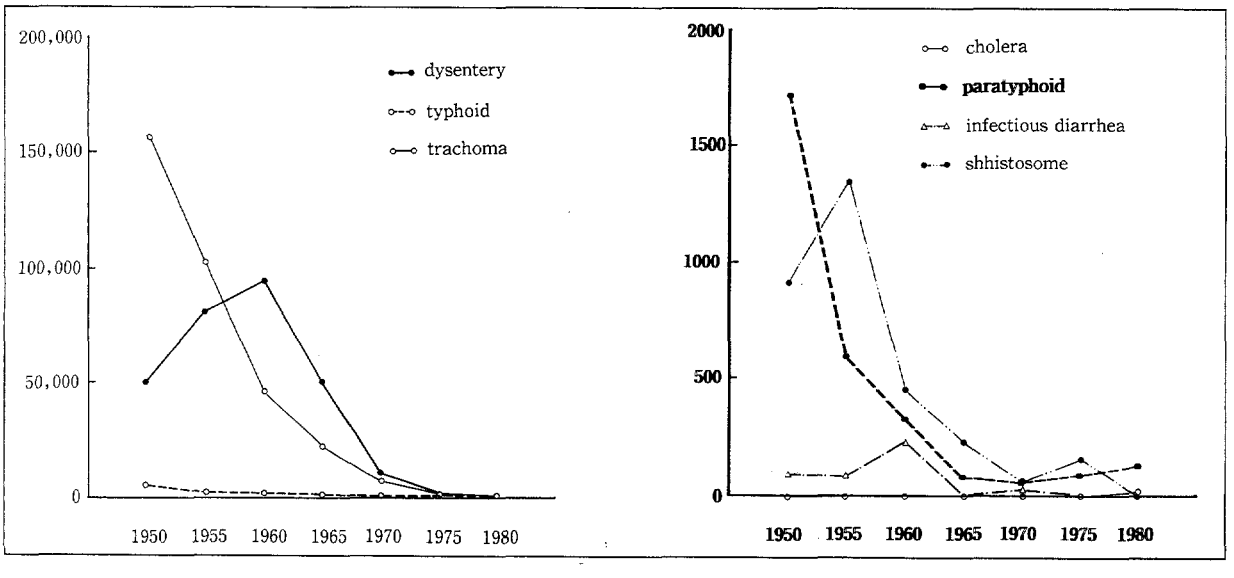


Figure 1.11: Cases of Waterborne Disease 1950-80

Source: Ministry of Health and Welfare

was also a major deterrent to taking legal action to redress complaints.

Fuelled by the Korean conflict, the high growth period after the Second World War was characterized by increasingly serious industrial and urban pollution, laying the foundation for a series of major disasters (e.g., the Minamata, Itai-itai, and Yokkaichi asthma outbreaks, which are described in the next Chapter). Although, Japan had achieved very high health standards overall, there were a number of localized pollution-specific health incidents of dramatic proportions. Figure 1.9 shows the location of some of these incidents. As epidemiological relationships between human health and the discharge of industrial pollutants became increasingly understood, anti-pollution protests became more sophisticated, and were directed at construction of industrial complexes and large scale land reclamation projects. However, pollution litigation continued to be dominated by local concerns, with general civil law procedures and precedents being followed.

Until the 1950s, most of the pollution related problems in Japan consisted of neighborhood pollution such as noise, offensive odor, soot and dust, and the violation of the right to sunshine. Despite arbitration involving local governments, and instructions to enterprises, many pollution-related damage suits were filed. In order to claim damages under civil law, the injured party was generally required to prove fault or intention on the part of the other party, and causal relationships in cases of neighborhood pollution had to be verified.

Illegality on the part of the polluter was determined by whether the pollution exceeded tolerable limits in the community; the definition of tolerable limits depended on whether existing rules had been observed, and local characteristics, including land use, and the damage prevention measures taken by the polluter. In many of the cases related to neighborhood pollution, damage compensation was obtained by litigation assisted by local government arbitration. At this time, however, despite evidence of damage to human health resulting from pollution, parties damaged were reluctant to enter litigation because of difficulty in proving fault on the part of the polluter. However, in the late 1960s the growing severity of pollution-related health problems gave impetus to a series of lawsuits; as detailed below,. These all resulted in findings in favor of the plaintiffs, and, taken together, were of major importance in influencing the national government's attitude toward environmental matters.

Urban Sanitation

During Japan's feudal period important basic sanitation measures began to be introduced. Wells were used for securing city water. In Edo (later renamed Tokyo), the Tamagawa water supply project was undertaken to provide people with drinking water. With respect to garbage removal and disposal, cleaning and disposal systems for burning and land filling of collected garbage in major towns already existed. In suburbs and villages, individuals simply disposed of waste material on vacant land.

At that time most night soil was collected by wooden pails from toilets and used as compost for rice fields and plowed land. Night soil at the lord's mansion or public toilets in towns was collected by private operators, and comprehensive collection was generally achieved. Most cities had side ditches for clean water and for domestic drainage water, which was then directly discharged into rivers. Because night soil was also collected and used separately, major towns were able to maintain high sanitation standards.

In the Meiji Era (the latter part of the 1800s) after the national isolation policy ended, the government planned to break from feudal society. Under the military and industrial strength policy, cities became densely populated, and contagious diseases such as cholera broke out on a large scale. Due to such epidemics, the government set urban sanitary improvement as one of the national priorities, and began extensive construction of the infrastructure necessary for providing citizens with clean drinking water. Implementation of sewerage systems in large cities took place in addition to improving night soil collection. Garbage collection was systematized, some disposal of solid waste by incineration was introduced, and land filling disposal methods were established elsewhere. Health centers were also established, aimed at preventing infectious and communicable disease. Prioritizing the prevention of contagious disease and parasites, and promoting infant health, the health centers functioned as a link between local communities and doctors in order to carry out health examinations such as stool tests and improved personal hygiene, and supplied nutritional and other knowledge necessary for health maintenance.

During this period the Public Cleansing Law was introduced. This aimed at shifting from traditional waste disposal methods to municipal systems, and required cities to be responsible for solid waste and night soil treatment. National health insurance was introduced for all citizens in 1938. While developing these policies, Japan introduced sanitary engineering and medical technology obtained from the US and Europe, particularly Germany. The national Public Health Institute, financed by a donation from the Rockefeller Foundation in 1937, also conducted and promoted research on public health.

The use of night soil as compost in agricultural villages decreased with the widespread use of chemical fertilizer in the post war period. For this reason, treatment facilities for night soil and ocean dumping disposal were accelerated. Improvements in night soil collection vehicles and the diffusion of digester chambers led to the upgrading of household facilities in addition to the expansion of sewerage systems.

As a result of these public health developments, urban sanitation standards in Japan by the 1960s had become comparable to those in Europe and the United States. Among indicators of success in this area, infant mortality per 1,000 births, which was about 30 in the 1960s, was just over 10 in the 1970s. The rate has continued to decline, and continues to be lower than that of the US (see Figure 1.10).

Morbidity due to contaminated drinking water (for diseases such as typhoid) was 50 per

0.1 million in the 1940s, became 1.0 in the 1960s, and below 0.5 in the 1970s. Because of progress in local health care, mortality from tuberculosis and gastroenteritis, which was about 100 per 0.1 million in 1950, fell to around 10 in 1970. These indicators have remained relatively unchanged since that time. Life expectancy increased from 59 years in 1950 to 65 in 1960, and 69 in 1970. It is now about 74 (see Figures 1.11).

Health centers (about 800 in total), which were primarily formed as the basis for local heath care, came to function as the lower reaches of administration and subsequently responded to the challenges posed by industrial and urban pollution. They also functioned as important centers for training of technical staff who later took responsibility for pollution administration. Large city administrations such as Tokyo, Osaka, Nagoya, and Yokohama accumulated expertise on urban sanitation and thereafter supplied skilled personnel to the rest of the country. These persons, who often became leaders in national pollution control efforts, were able to function quickly and effectively in large part due to their prior experience in urban sanitation work.

Summary of Events Leading to the Basic Law

By the late 1960s, economic growth in Japan had led to a wide variety of urban sanitation and pollution problems, and many ways of addressing them. (These are summarized in Annex 7, *Evolution of Urban Sanitation and Pollution Problems and Measures Prior to 1970*). Public officials at the local level were the first to react to the new political reality exemplified by these problems, as well as by the series of lawsuits and growing public opposition to polluters, and they in turn placed pressure upon the national government to take positive action. Legislative action at the national level took time to develop, but as an interim measure, was preceded by the provision of subsidies and guidance for small and medium industry, and instructions and guidance for large industry. Predictably, these measures were inadequate, but had some impact because of continued and growing popular demand for environmental improvement. This encouraged city leaders to take stronger measures against polluting industries; their power to do so was also growing as industry's demand for scarce urban land (use of which was under their control) increased.

Designation of city areas according to use started to become more systematic at this time, and the City Planning Law, introduced in 1968, required separation of residential from industrial areas. Voluntary Pollution Control Agreements also started to come into effect. Local governments began to obtain financial assistance from the national government to assist medium and small enterprises by construction of collective wastewater treatment works and to subsidize their relocation to coastal reclaimed land. However, the latter policy, while assisting in pollution control, caused much destruction of the natural shoreline.

It is clear that the long history of urban sanitation and the accumulation of experience in human resources and technology in this area have helped to provide a solid foundation for subsequent progress in dealing with pollution.

Although local governments had addressed urban sanitation for many years, comparable actions against industrial pollution lagged well behind, being limited to measures on neighborhood pollution. As noted earlier, during the pre-war period these were subordinated to the development of the country's military and industrial complex. However, as industrial pollution became increasingly serious during the first high growth period in the 1950s, citizens' complaints about damage caused by pollution placed growing pressure on public authorities to take action. In practice it was the local government authorities that were the primary recipients of these complaints; and it was at this level that pollution control activities, such as authorization of industrial siting and emission levels were initially introduced.

However, this piecemeal approach, involving inconsistent and sometimes competing efforts among local governments, was very inefficient, and only impacted upon the most extreme polluting activities. Meanwhile, industrial pollution became ever more pervasive throughout the country, as economic growth continued apace through the 1960s. Serious pollution-related diseases such as Minamata, Itai-itai and Yokkaichi asthma broke out, and opposition movements to sites for waste disposal and industrial complexes intensified, as did pollution litigation. Industrialists began to realize that this situation might threaten profits.

The role of the mass media became of great importance in stimulating awareness of the impact of pollution on human health and of the causal relationships involved. It also alerted citizens to the shortcomings in industrial practice and in government policies which allowed this practice to occur. Encouraged by the press and television, popular movements against pollution intensified everywhere, and it became an increasingly important topic in local politics and mayoral elections. The local governments that emerged from this process recognized that they could not deal adequately with environmental problems by themselves, and put pressure on the national government to become more heavily involved. Finally, the national government took concrete action. In 1967 the Basic Law for Environmental Pollution Control was enacted. The process of decision-making by which the substance of this law was determined is described in Annex 8, *Case Studies in Government Decision-Making: Evolution of the Basic Law for Environmental Pollution Control, 1967 and Revision of NOx standards, 1978.*

In summary, the content of the Basic Law for Environmental Pollution Control was as follows:

- The stated objective was to protect the nation's health from damage caused by pollution, to preserve the living environment in harmony with economic development, and to contribute to public welfare.
- Environmental standards were established to protect human health and to preserve the environment. The government was required to make a scientific examination of environmental standards periodically and to revise them if necessary.
- Emission and effluent standards were established for settling environmental disputes.
- Subsidies through fiscal instruments should be made available to small and medium

sized businesses for pollution control.

■ The pollution control strategy should designate special pollution control areas in which comprehensive measures should be applied.

■ The responsibilities of the national government, local governments, enterprises and residents in pollution control, were defined.

(More detail on the Basic Law for Environmental Pollution Control is presented in Annex 9.)

Footnotes:

[1] In general, the best information about environmental conditions in the years prior to the Basic Law relates to the Tokyo Prefecture. In this section, therefore, much of the illustrative material refers to the Tokyo area.

[2] And is also described in detail in Case Studies.

[3] Further details on other cities are to be found in Case Studies.

[4] The Industrial Structure Council is a high level body which includes scholars and representatives of industry and local government, and which advises the government on national industrial policy.

Pollution Litigation in the Early 1970s

As noted in Chapter 1, years of disregard for the environmental consequences of certain industrial operations in Japan culminated in a series of public health disasters which did much to stimulate governments to take serious action against pollution. Cooperation on the part of industry was also assisted by the results of four landmark cases in which victims of industrial pollution sued the industrial enterprises concerned for the damages suffered. The courts found in favor of the plaintiffs in all four cases, the trials all being concluded during the first half of the 1970s. Brief summaries of the cases follow below; further details are to be found in Annex 10, .

Niigata Minamata Disease Minamata — named after a small town in which the disease was first observed — is a disease in which the organic mercury in factory effluent is accumulated inside the human body through consumption of fish. Numbness of limbs, difficulty in walking, and sometimes insanity and death result. The disease can affect unborn babies. Over 1,800 people are presently certified as suffering from the disease. Plaintiffs, consisting of victims and their families, filed suit in 1967 to claim damages from the enterprise which had discharged the pollution-causing effluent. They won the case in 1971. Compensation paid was 270 million yen to 77 victims and their families.

Kumamoto Minamata Disease In 1969, the plaintiff consisting of the victims and their families (31 families, 141 people), claimed damages against the enterprise which had discharged the pollution-causing effluent, and won the case in the first trial in 1973. Compensation was 930 million yen including legal costs. Standard compensation was 18 million yen for each death and 16 to 18 million yen to the survivors. Subsequently many more victims of Minamata disease have been identified, and legal proceedings continue.

Itai-itai Disease Itai-itai is a disease caused by cadmium poisoning causing intense pain throughout the body, fracturing bones, and even resulting in death. In 1968 victims and their families (489 people including 164 victims), having identified causal relationships, filed suit to claim damage against the mining enterprises for having discharged effluents containing cadmium and won the case in the first trial in 1971. At the second trial in 1972 with actual guilt established, compensation was 2.3 billion yen: 12 million yen for each death and 9.6 million yen per survivor.

Yokkaichi Asthma. Inhalation of sulfur oxides is a major cause of chronic bronchitis, bronchial asthma, and pulmonary emphysema. Yokkaichi asthma causes bronchospasms and difficulty in breathing. Today about 900 people in Yokkaichi city are still recognized as suffering from this disease. In 1967 residents filed a suit to claim damage and compensation against sixteen enterprises comprising the local industrial complex, having identified the causal relationship between asthma and the sulfur oxides discharged. A second trial was concluded in favor of the plaintiff in 1972. In the first trial the enterprises were jointly required to pay the plaintiff a total of 90 million yen. At the sec-

ond trial, the plaintiffs, consisting of 140 people, won compensation of 10 million yen for each death, 6.5 million yen for an in-patient, 5.5 million yen for an out-patient and 3 million yen for each child: Total compensation amounted to 569 million yen.

These cases established a number of important principles, which assisted in instituting the Pollution-Related Health Damage Compensation Law in 1973 and in introducing the principle of no-fault-liability which was a feature of the Air Pollution Control Law of 1972. They also resulted in the elimination of the "harmony with economy" clause in the Basic Law for Environmental Pollution Control.

First, conventional judicial precedents had established that as long as enterprises had taken reasonable measures to reduce pollution, they were not legally at fault. However, in the four major cases referred to above it was determined that enterprises should take maximum preventive measures if damage to human life or health is involved. In the Itai-itai case, for example, proof of fault was deemed unnecessary and only verification of the causal relationship was required.

Also, the plaintiff, as in general civil law, had previously been required to prove the existence of a causal relationship in a damage suit. But, in the Itai-itai case, a different judgement was reached: as long as there are sufficient facts to assume the causal relationship between the act and the damage, absent strong counter-proof to that assumption, enterprises must take responsibility for the act – even without complete verification and strict scientific study. In effect this shifted a part of the victims' responsibility for verifying causal relationships onto the enterprises. This ruling has had a major impact on subsequent litigation.

In the same case, judgement was reached regarding air pollution caused jointly by several different enterprises. The court found that with regard to the overall causal relationship between the pollution caused by joint emissions of several factories and actual damages, the factories can be held commonly responsible for the purposes of determining compensation. This ruling has had a greater impact on industry than any other pollution litigation. In addition to health damage, property damage can also be included in compensation payable.

Suspension of Projects Suits have also been filed for the suspension of projects which might generate pollution later, instead of simply claiming damages after the event. Such litigation was applied to Osaka International Airport (filed in 1969), Nagoya Shinkansen (Bullet train noise filed in 1974), and to suspend the Kawasaki Steel Chiba factory expansion plan in 1975. Results included the suspension of night flights at the Osaka International Airport in 1974 and further suspension resulted from a second trial in 1975. On the other hand, the claim for suspension was rejected in the first trial of Shinkansen Noise Litigation in 1980.

During the 1970s, many other cases were filed for suspension of operations in public facilities or projects, such as the Hanshin Expressway, and several raw sewage treatment plants, factories, roads, and oil pipelines. However, after a ruling in the Supreme Court on the

case of Osaka International Airport in the 1980s, that abstract claims for suspension were not legitimate, the suspension of projects relative to aircraft and Shinkansen pollution became problematic, and many claims were denied or withdrawn. Legal action to construction because of their potential environmental damage became less and less frequent.

Although litigation, or its possibility, has led to greater anti-pollution measures in public projects, the court rulings have meant that Japan's Environmental Impact Assessment Law and associated procedures are not as effective as they could be. Pollution litigation has, by establishing the principles of liability and compensation, and by creating publicity harmful to the reputation of the concerned enterprises, contributed greatly to the promotion of anti-pollution measures after damage has been done, and therefore acts as a deterrent to the generation of more pollution. However, more direct avoidance of pollution by legal challenge to individual projects in advance of their construction would seem to merit more support from the courts. Prevention is indeed, better than cure, and is certainly better than compensation.

The Emerging Role of the National Government

Prior to the 1970s, virtually total responsibility for pollution control, if it existed at all, had been with local governments. All major governmental initiatives were taken at the local level, primarily in the large cities. Although environmental degradation in its many forms was becoming increasingly of concern, the national government's role had been little more than to provide guidance. Such efforts however were extremely weak; national policy was heavily oriented toward industrial growth, and cities were reluctant to impose strict controls as they competed with each other to attract industry. Indeed, they contributed to the problem by land reclamation schemes in the coastal areas, as well as the construction of massive industrial complexes, often with little attention to their environmental consequences.

Around 1970, the Japanese government began to assume a more substantial role with regard to environmental problems. This was largely in response to the growing awareness of the Japanese people about environment, and increasing knowledge of the risks to health brought about by environmental degradation, particularly pollution. Wide publicity given by the media to the major environmental disasters referred to above were of extreme importance in stimulating government action at the national level.

Environmental degradation, in particular that caused by the discharge of industrial wastes, had therefore become a major political issue by the middle to late 1960s. In 1970, a special Diet session focusing only on environmental pollution issues was held. It was the so called "Environmental Pollution Diet." During this session, 14 bills were established into law. Although the theme of harmony with economic development was at the heart of these laws, a number of measures which were to have a major impact upon industrial operations were enacted. For exam-

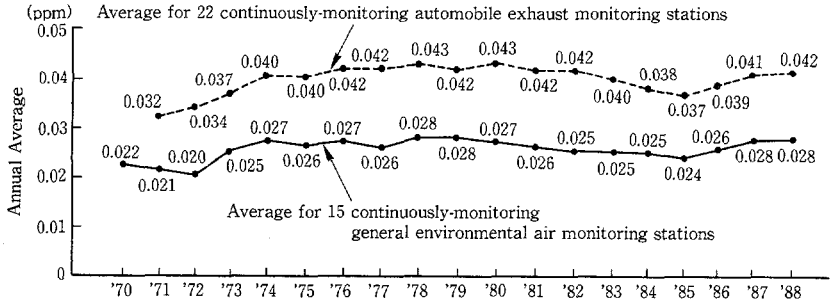
ple, in 1971 the existing Basic Law was revised and the article stipulating that anti-pollution measures should be subordinate to economic development objectives was deleted. Every factory in Japan, not only as hitherto, those in designated areas, was now to be subjected to anti-pollution legislation. Local governments were given authority to set up emission standards more stringent than the national ones. Polluters themselves should be primarily responsible for paying for the cost of pollution control.

With respect to the relief of those suffering from illness that resulted from pollution, the Yokkaichi city government in the late 1960s introduced a system in which it covered 100% of the medical expenses of pollution-related illness. With this background and the provision of the Basic Law for Environmental Pollution Control requiring the implementation of a procedure for compensation of victims, the Law concerning Special Measures for the Relief of the Pollution-Related Patients was established in 1969. Based on this law, Japan's Federation of Economic Organizations (private industrial circle) established a health care foundation, to which industry voluntarily donated money. The foundation did not specify the responsibility of polluting industry and did not attempt to identify causal relationships. Funds from the foundation were paid to local governments in a designated account through the Environmental Pollution Control Service Corporation.

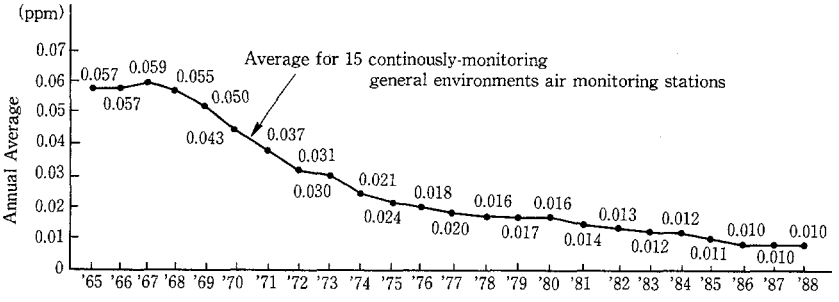
Following the legal victory of the Yokkaichi residents in 1972, in which the court ruled that epidemiological analysis could be used to identify the cause of damage to an individual victim, the Pollution-Related Health Damage Compensation Law of 1973 was established. Although the Law concerning Special Measure for the Relief of the Pollution-Related Patients only covers health care relief, the 1973 law can compensate those who have lost income due to pollution-related disease. The law covered issues such as the definition of a pollution-related victim, amount of compensation, and cost-sharing. However, it also created a system for reimbursing victims of air pollution where specific cause and effect relationships between an individual polluter and victims cannot readily be established; i.e., in those frequently encountered cases in which victims and sources of pollution are widely dispersed.

Despite these events, the national government, which was eventually taking the lead in Japan's environmental program, was still doing so somewhat reluctantly. In the early years, it continued to subordinate environmental concerns to its policy of industrial promotion. The Japanese Environment Agency was established in 1971, and MITI, the Ministry of Construction, and Ministry of Health and Welfare reorganized and reinforced their anti-pollution activities, and set up the Environmental Pollution Control Service Corporation, later to be known as the Japan Environment Corporation. These agencies constituted the national government's administrative base for it efforts to combat pollution. However, MITI, and the Ministries of Construction, Transport, Agriculture, and Forestry and Fisheries, were at that time still not convinced about the seriousness of the environmental problem, and policy still primarily reflected the views of industry on

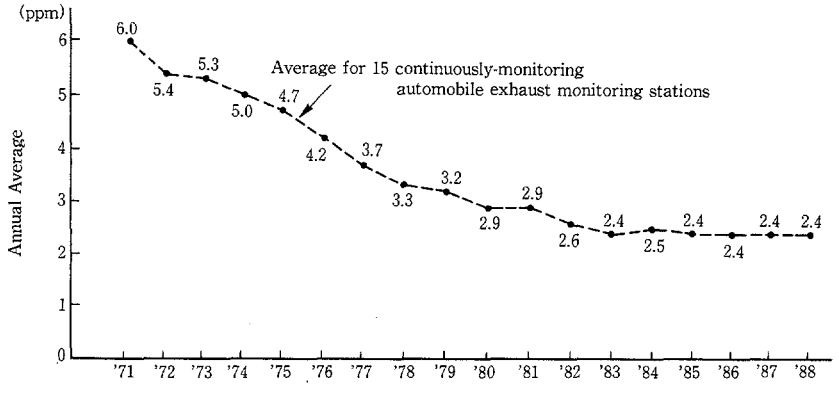
Nitrogen dioxide (NO_2)



Sulfur dioxide (SO_2)



Carbon monoxide (CO)



Suspended particulate matter (SPM)

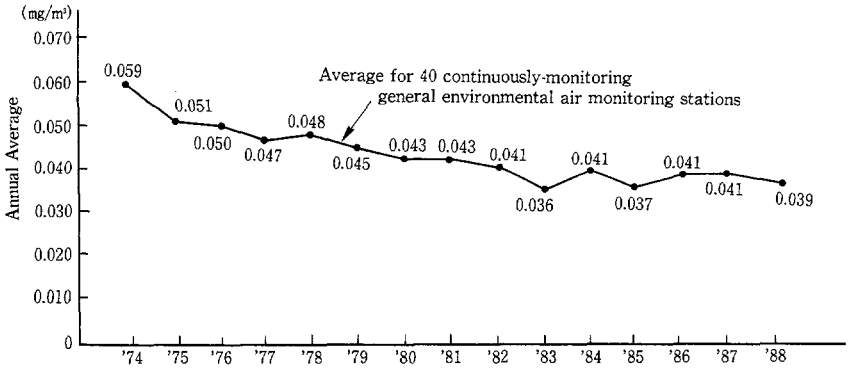
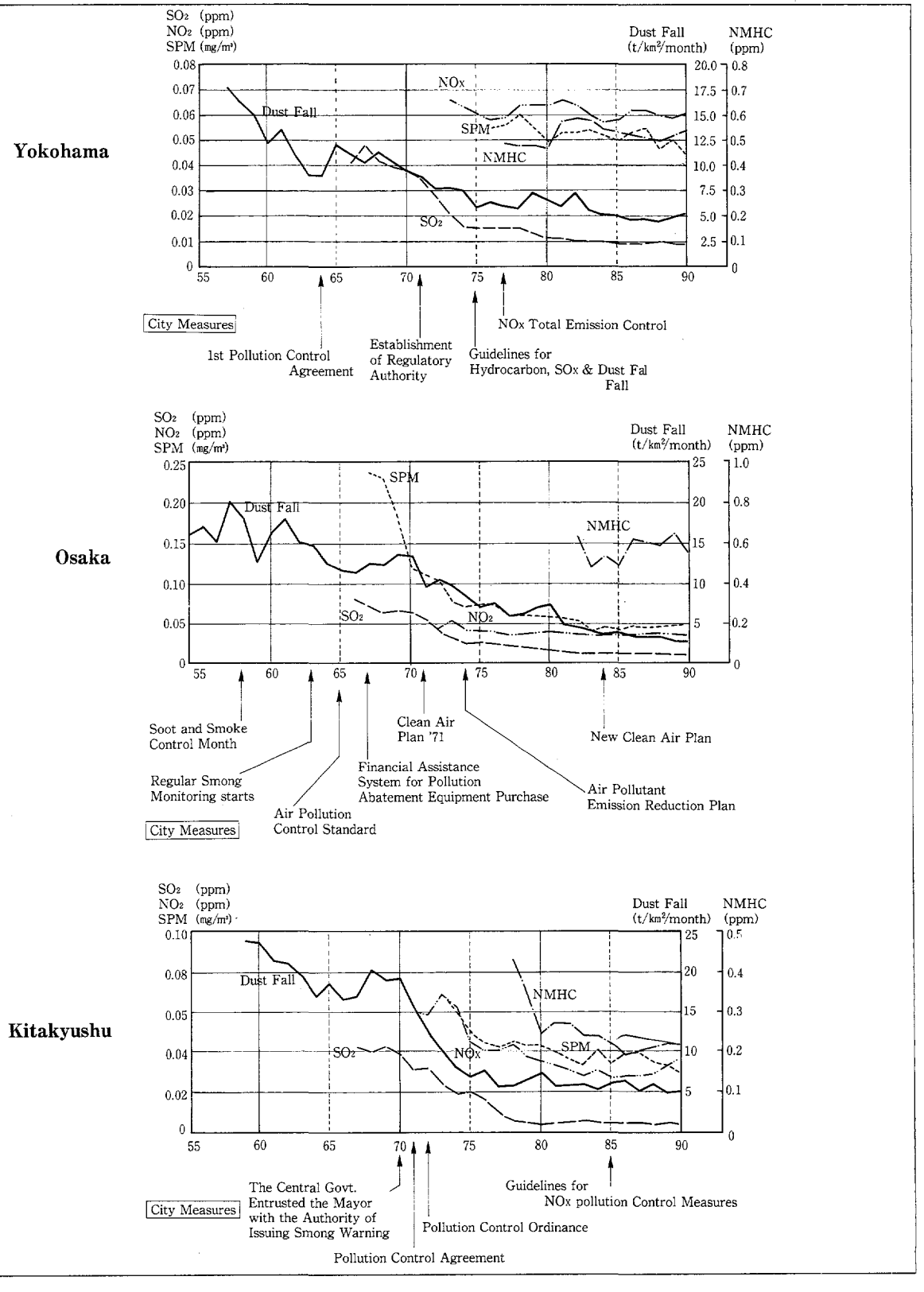


Figure 2.1: Ambient Air Quality Indicators: National Averages 1971-88

Source: Japan Environment Agency

Figure 2.2: Ambient Air Quality: General Environmental Monitoring Stations (Yokohama, Osaka, and Kitakyushu) 1955-90



Source: Case Studies

this subject. Key positions in the newly created Environment Agency were initially occupied by staff transferred from Ministries with special interests, which did not obviously coincide with environmental objectives. Thus, persons in charge of air and water pollution were transferred from MITI, motor vehicle pollution from the Ministry of Transport, and soil pollution and agricultural chemicals from the Ministry of Agriculture.

As awareness of the seriousness of environmental degradation and its consequences for economic growth has matured, so has the evolution of the government's environmental policy. Key positions in the Environment Agency are increasingly being filled by staff from ministries likely to be more sympathetic to environmental concerns, such as the Ministry of Health and Welfare. Nevertheless, the Environment Agency still only has the power to "coordinate" environmental decision-making within the national administration, and often has to confront a powerful coalition of Ministries, politicians and private industry in trying to effect reform. It cannot introduce any new environmental regulation without the agreement of the government as a whole. The Environment Agency in many cases represents and articulates the views of the people in dealing with the rest of the national administration, and drafts measures accordingly; ultimately, however, its success depends upon the strength of popular support for environmental improvement.

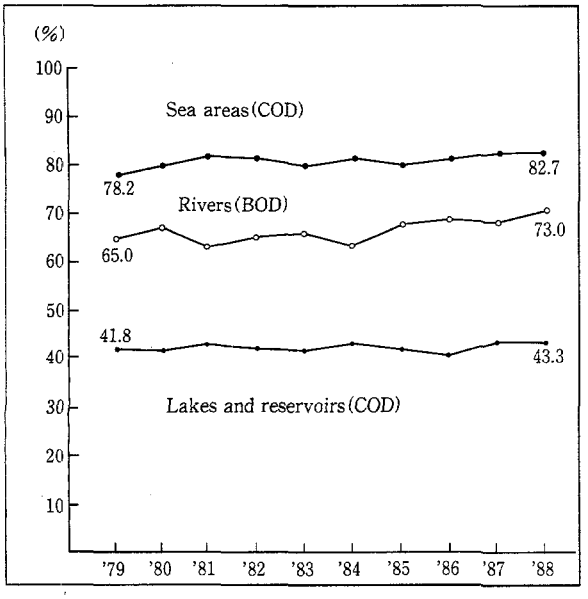
Pollution Control Measures and Trends in Environmental Indicators

Air Quality At about the same time as the Basic Law for Environmental Pollution Control was established, the existing Soot and Smoke Regulatory Law was revised and enacted as the Air Pollution Control Law. This act, which established ambient air quality and emission effluent standards, was the first major measure to counter air pollution at the national level. Accompanied by efforts of national and municipal governments with the co-operation of private industry, the act accelerated the improvement of combustion processes, conversion to low sulfur fuel, and installation of air pollution control facilities. During the latter half of the 1970s, measures to reduce air pollution were greatly improved. This is illustrated in Figure 2.1 on a national level with regard to NO_2, SO_2 and CO. These national trends are illustrated in more detail by the experience of Yokohama, Osaka, and Kitakyushu (Figure 2.2). It will be noted that dramatic improvements in these indicators followed enactment of the Air Pollution Control Law.

Measures to reduce NOx also progressed, and emissions from exhaust gas, which is one of the major sources, decreased sharply on a *per automobile* basis as a result of stringent regulations imposed on the automobile industry. However, as Figures 2.1 and 2.2 show, *total emissions* have remained relatively stable over the last twenty years due to the growth in automobile traffic. Consequently, in this respect, ambient air quality standards in the large cities have not yet been achieved.

Water Quality Extensive pollution control activity followed the Water Pollution Control Law, which was introduced in 1971. This established uniform national effluent standards for specified facilities from which effluents are

Figure 2.3: Compliance with Water Quality Standards 1979-89



Source: Japan Environment Agency

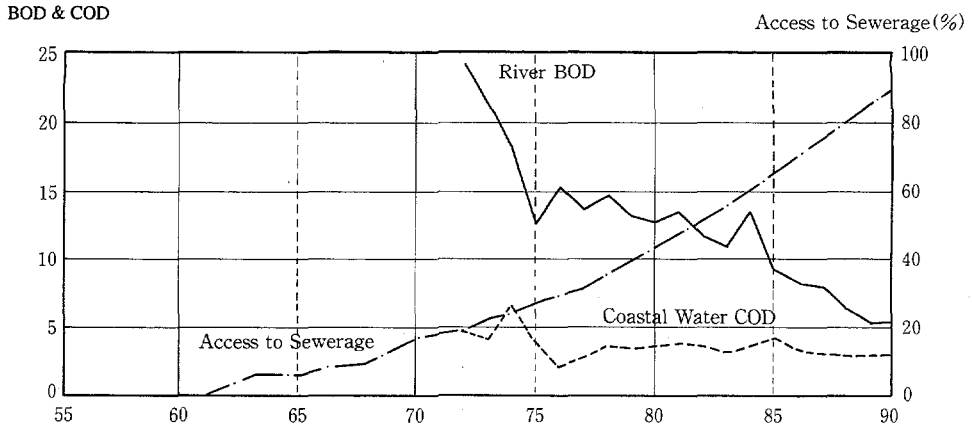
discharged into public waters, and also established ambient water quality targets. Noting that in some water areas uniform national standards may be insufficient to achieve environmental quality objectives, the law provides that stricter standards can be set under prefectural ordinances. A comprehensive system for establishing standards and counter-measures was then set up (this is summarized in Annex 11, *Water Pollution: Responsibilities for Standards and Countermeasures*). However, the quality of en-closed water areas (bays, inland seas, ponds, and lakes) and rivers running through urban areas, which are contaminated by organic pollutants, still does not adequately meet ambient standards. Progress in water pollution control may be assessed in terms of compliance with established standards (details of which are to be found in the next Chapter). As Figure 2.3 demonstrates, the record of compliance with BOD or COD standards has improved slightly over the last decade. Compliance for lakes and reservoirs remains particularly low, although some improvement has been observed in recent years.

Although the quality of industrial effluents has considerably improved over this period, improved ambient water quality has been hampered by the decreased water flow of urban rivers due to growing industrial abstraction, as well as by delays in controlling domestic waste discharges. Generally, the expansion of sewerage systems and associated investment in sewage treatment has been an important factor in improving ambient water quality. As Figure 2.4 shows, in Yokohama, Osaka and Kitakyushu, where there is extremely high access to sewerage, considerable improvements in river quality have been observed in recent years, although indicators for coastal waters are less impressive.

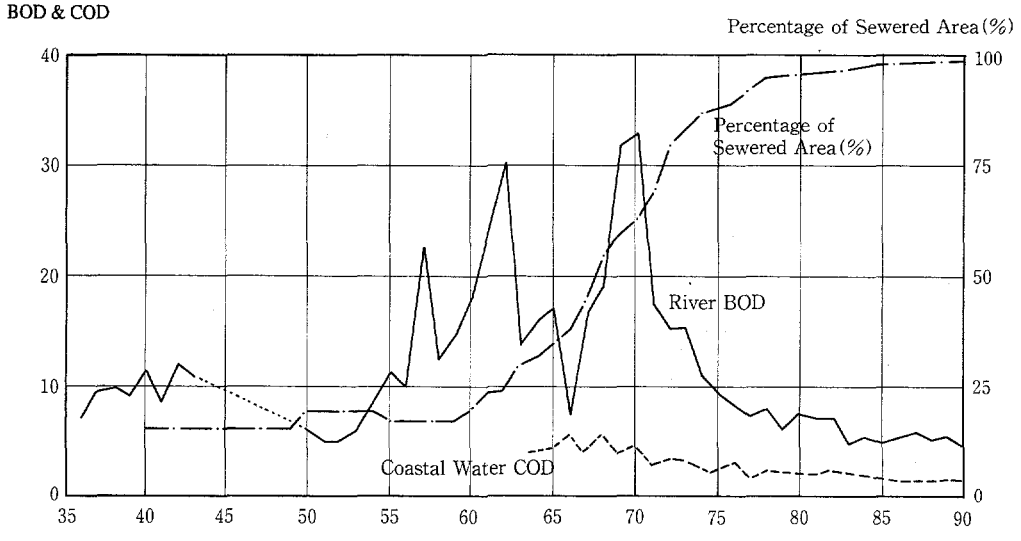
As illustrated in Figure 2.5, the record of compliance with national environmental quality standards relating to human health has been good, with major improvements being observed during the early 1970s. Owing to strengthened regulations, dredging of polluted sediments, and implementation of containment operations, significant reductions in the discharge of heavy metals and other pollutants influencing human health have been achieved, and health-related environmental quality standards are now attained in most water areas.

Noise and Vibration It was not until the enactment of the Basic Law for Environmental Pollution Control in 1967 that strong measures to reduce noise were promoted. The regulatory measures were laid down in the Noise Control Law of 1968, and the Vibration Control

Yokohama



Osaka



Kitakyushu

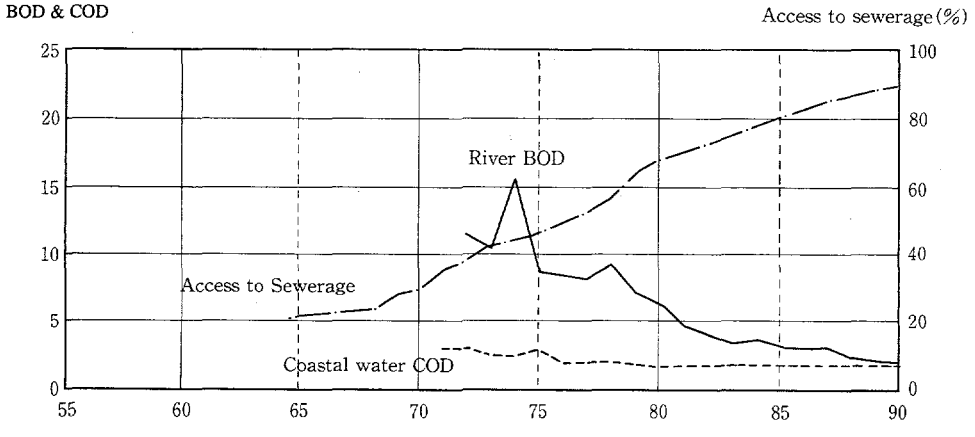
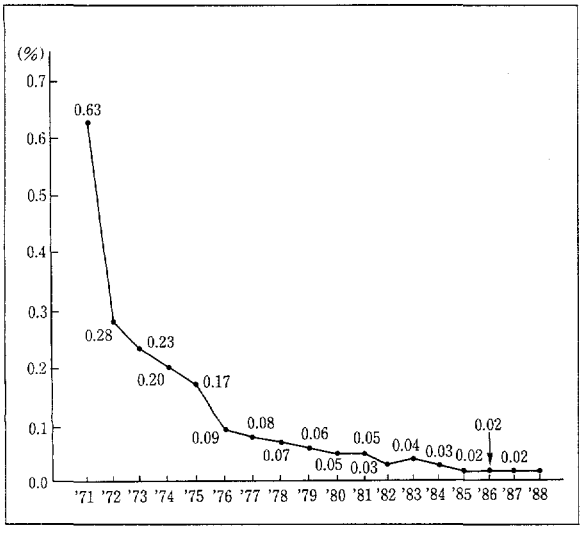


Figure 2.4: Water Quality in Public Waters and Access to Sewerage by Residences (Yokohama, Osaka, and Kitakyushu) 1955-90

Source: Case Studies

Figure 2.5: Non-Compliance with Environmental Quality Standards Related to Human Health 1971-89



Notes:

1. The non-compliance ratio consists of samples exceeding EQS to the total number of samples.
2. EQS on health aspects specify that cyanide, organic phosphorus, alkyl mercury and PCBs should not be detected, cadmium should be less than 0.01 mg/l, and total mercury should be less than 10.005 mg/l.
3. The value for mercury is not included in this figure.

Source: Japan Environment Agency

Law of 1976, and national ambient noise standards were established in 1971.

In regulating point sources, local governors entrusted city mayors to assign areas to be regulated. Factories with designated facilities or designated construction activities, as listed in the provisions, are regulated by this system. Individual standards are established by the local governor within the ranges established by the Environment Agency. Legal obligation was assigned to designated factories, or to designated construction activities. If they appear to violate the standards or to degrade the living environment, the local governor can comment on the plan and can order that improvements be carried out.

In areas where noise and vibration became critical problems because land was used by both residences and industry, measures were taken that included building insulator fences and relocation of factories to other areas. Since many of the factories concerned are small or medium scale enterprises, some supporting programs have been promoted, including loans for relocation by the Small and Medium Enterprises Finance Corporation and construction of industrial estates for relocation managed by the Japan Environmental Corporation.

The Noise Control Law and the Vibration Control Law enable the Environment Agency to establish maximum permissible limits for traffic noise. If measured levels of noise or vibration exceed the standards, the local governor should ask the corresponding local public order committee, which is also concerned with traffic affairs, to take measures according to provisions of the Road Traffic Law.

Public nuisance lawsuits such as those relating to the Osaka airport and the Shinkansen super-express train in Nagoya have affected the development of policy concerning traffic noise. The Osaka airport lawsuit led to certain legal measures such as the promulgation of ambient standards for aircraft noise (1973), the amendment of the Aircraft Noise Nuisance Prevention Law (enacted in 1967 and amended in 1974), and establishment of responsibility for development around the airport area (1974). Administrative measures have included compensation for relocation by the authority; implementation of countermeasures to abate noise nuisance such as the installation of insulators; and limitations on airport operations at night and restriction on the number of flights. Similar measures were developed for the Shinkansen train such as the

promulgation of noise standards; guidelines for vibration, and Cabinet agreement in 1976 concerning the principles of railroad noise countermeasures which provided the basis for compensation for relocation or for installing insulation for noise reduction. However, despite such progress, traffic noise from these various sources remains an important problem in Japan.

Solid Waste and Urban Sanitation

Solid Waste Traditionally, solid waste collection and disposal was carried out by private individuals and firms, but local governments have started to assume responsibility for this due to complaints about poor service and over-charging. Today, responsibility for managing solid waste disposal rests virtually entirely with municipal governments. Many cities, such as Yokohama, actually operate the system themselves; others contract out to private enterprises. Others employ both their own city workers and private contractors. In Tokyo for example, actual waste collection is done by city employees, but they use collection vehicles (and drivers) belonging to private contractors. The overall national framework for solid waste management is contained in the Waste Treatment Law of 1970 which set up a system of supervision and guidance, specifying the responsibilities of local governments, ordinance-designated cities and other organizations in this area.

In general, there is a growing trend to rely more upon private contractors for solid waste collection, but in contrast to earlier times, these are now closely regulated by public authorities. In addition, large solid waste dischargers such as building contractors are typically required to ensure that their waste is delivered to municipal waste disposal sites or incinerators operated by the local government. Municipalities continue to be responsible for the overall management of solid waste, and for ensuring that the contractors operate efficiently.

Large waste dischargers have for many years been required to pay fees for solid waste collection and/or disposal based upon volume or weight. Prior to the 1960s, householders paid fees which were sometimes based on house size and sometimes on a fixed amount per household. This practice tended to die out in the following decades, when costs of solid waste collection and disposal were simply financed out of local taxation. However, there are signs that practice is changing again. In fact, the Japan Municipal Mayors Association recommended in 1993 that householders should pay fees based upon volume. About 20% of the municipalities already do this. The predominant method for collecting fees is for the municipal authorities to sell certain types of plastic bags to householders at a predetermined price. The municipality concerned will only collect waste put out in these bags. Alternatively, households may purchase special stickers which identify waste bags authorized to be collected by the municipality. Some municipalities have adopted systems of progressively higher fees, the greater the volume of waste. Charges for the collection and disposal of solid waste from industrial establishments depends upon the volume or weight of such wastes.[5]

Recent initiatives to introduce this kind of system have had good results, reducing total solid waste generation by up to 50%. So far, these measures do not appear to have generated much private, illegal dumping. Since most of the local governments concerned are in relatively small towns, social pressure might be an important explanation for this; it is not necessarily the case that this would apply in bigger cities. It is however, obviously true that the institution of any measure to raise fees requires a parallel institutional capacity, consumer education, or the existence of social conscience on the part of the public to make it work. Formal policy mechanisms of this kind cannot necessarily be transplanted from one situation to another and work successfully unless a range of other institutional and social instruments are in place. Clearly, this example is illustrative of a principle that is of more general application.

The total amount of solid waste generated in Japan was roughly 1,000 g/day/person in 1970 and since then has increased in line with the growth in population. The total amount generated was 138 thousand ton/day, or 50.4 million ton/year in 1990. Taking Tokyo as an example, roughly 40% of solid waste is generated by households, the remainder from industry and public facilities. About 70% of solid waste is collected by the municipality, the remainder being self-hauled. The composition of solid waste in Tokyo is depicted in Figure 2.6.

As reported by the Environment Agency in 1989, of the total amount of solid waste generated by industry, about 36% was in the form of sludge, 13% slag, 16% demolition waste, and 20% livestock excretion. Of the 8,768 operators of industrial waste disposal facilities, 6,553 were enterprise operators, 1,318 were licensed industrial waste disposal operators, and 897 were

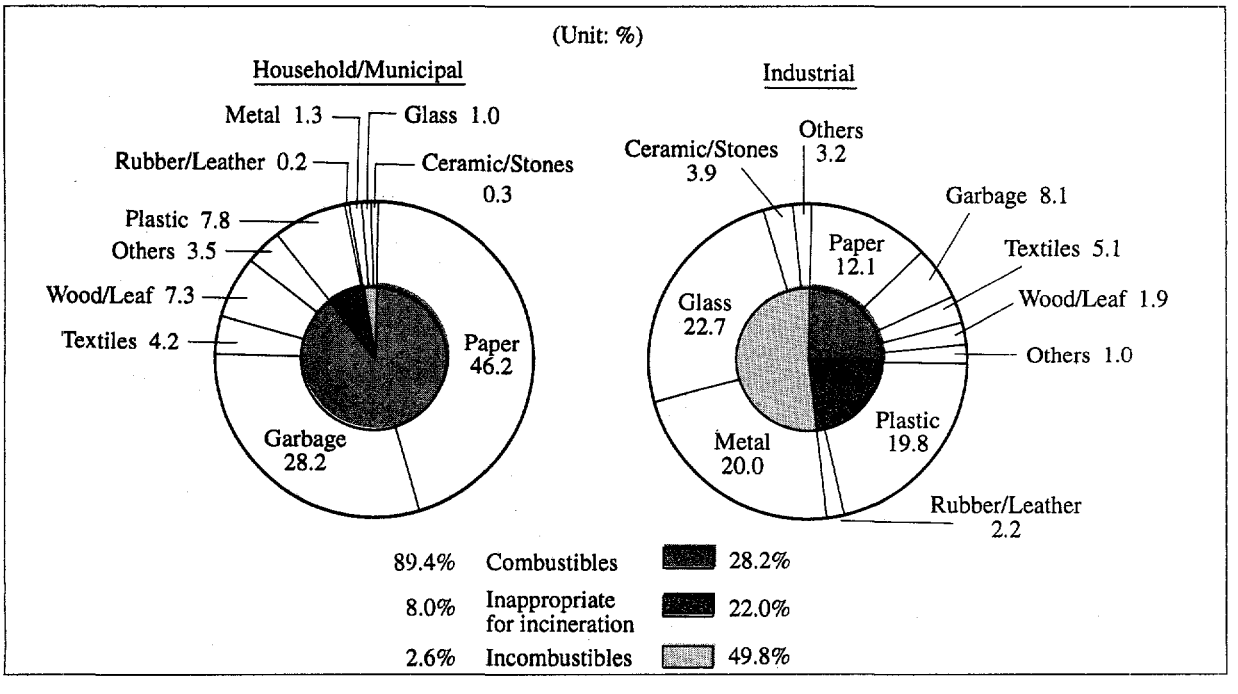


Figure 2.6: Composition of Solid Waste in Tokyo

Source: Tokyo Metropolitan Government

public bodies. About 60% of the facilities were for sludge dehydration, and about 17% were for plastic crushing and incineration. With regard to final disposal, of the 2,083 sites, 625 were operated by the enterprise concerned, 1,296 by licensed industrial waste disposal operators, and 162 by public bodies.

Given the rate of economic growth, especially the growth of tertiary industry during this period, stabilization of the amount of final waste per capita in Japan over the last two decades has been a considerable achievement. However, this has not been achieved by measures to reduce solid waste generated at the household level. Incentive systems such as deposit-refund systems or other inducements for recycling are not significant in Japan. Also, as noted above, it is only recently that charges based upon volume of waste have started to be introduced. Instead, control of the volume of final waste created in Japan has been achieved at great cost, by means of a massive construction of incineration facilities: thus, by 1990, incineration facilities with a total capacity of 173 thousand tons per day (which exceeds the total amount of waste) were in place. This heavy reliance upon incineration has been criticized in that it increases the emission of greenhouse gases, but this effect is offset to some extent since the process is also used in the generation of electric power. The growing reliance upon incineration in major cities is illustrated by the experience of Yokohama, Osaka, and Kitakyushu (Figure 2.7).

In summary, some features of the present treatment system are as follows:

a) Local governments spend a large amount on investment and operation of the treatment systems. The cost of waste treatment works was 1,390 billion yen, or 11,000 yen/person in 1990.

b) Focus has been on treatment and disposal, with less emphasis upon measures to actually reduce the amount of waste generated by industry and households. Little has been done to combat a "throw away" mentality.

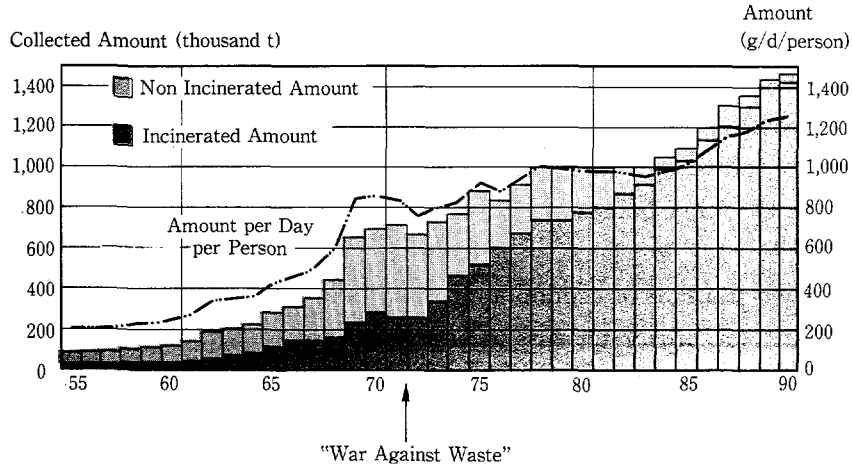
c) One third of total waste is still disposed of by landfill, and large cities depend on the reclaimed land. This has caused destruction of the coastal environment.

d) The present system of incineration-landfill does not include waste reduction mechanics. Also, the countermeasures are not satisfied for CO, and groundwater pollution has been caused by dioxin from incinerators and leachate from final disposal facilities.

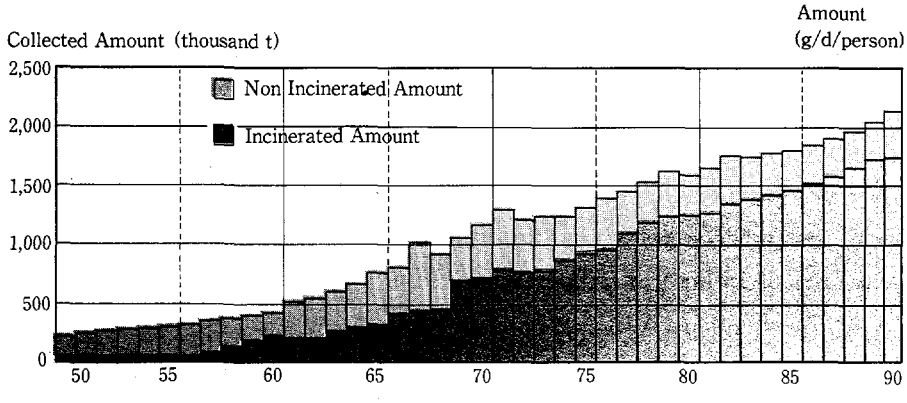
Urban Sanitation In 1965, about 8% of Japan's population, concentrated in large cities such as Tokyo, Osaka, and Yokohama, had access to sewerage,. More generally, night soil was collected by vacuum trucks from septic tanks ("joukasous") and dumped into the ocean. Until World War II, night soil was usually put in buckets, and carried from villages by carts and boats. Night soil had been sold for fertilizer since the 1600s and was replaced by chemical fertilizers after the 1960s. Additional sewage treatment facilities were then required. Demand for flush toilets has also increased. Wastewater from flush toilets has been collected in joukasous and discharged into rivers after individual treatment. This system, called the "single-function septic tank" has been widely

Figure 2.7: Solid Waste Disposal (Yokohama, Osaka, and Kitakyushu) 1955-90

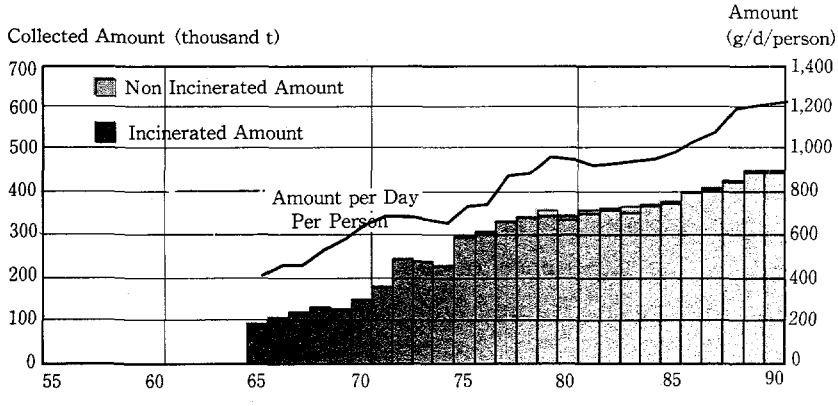
Yokohama



Osaka



Kitakyushu



Source: Case Studies

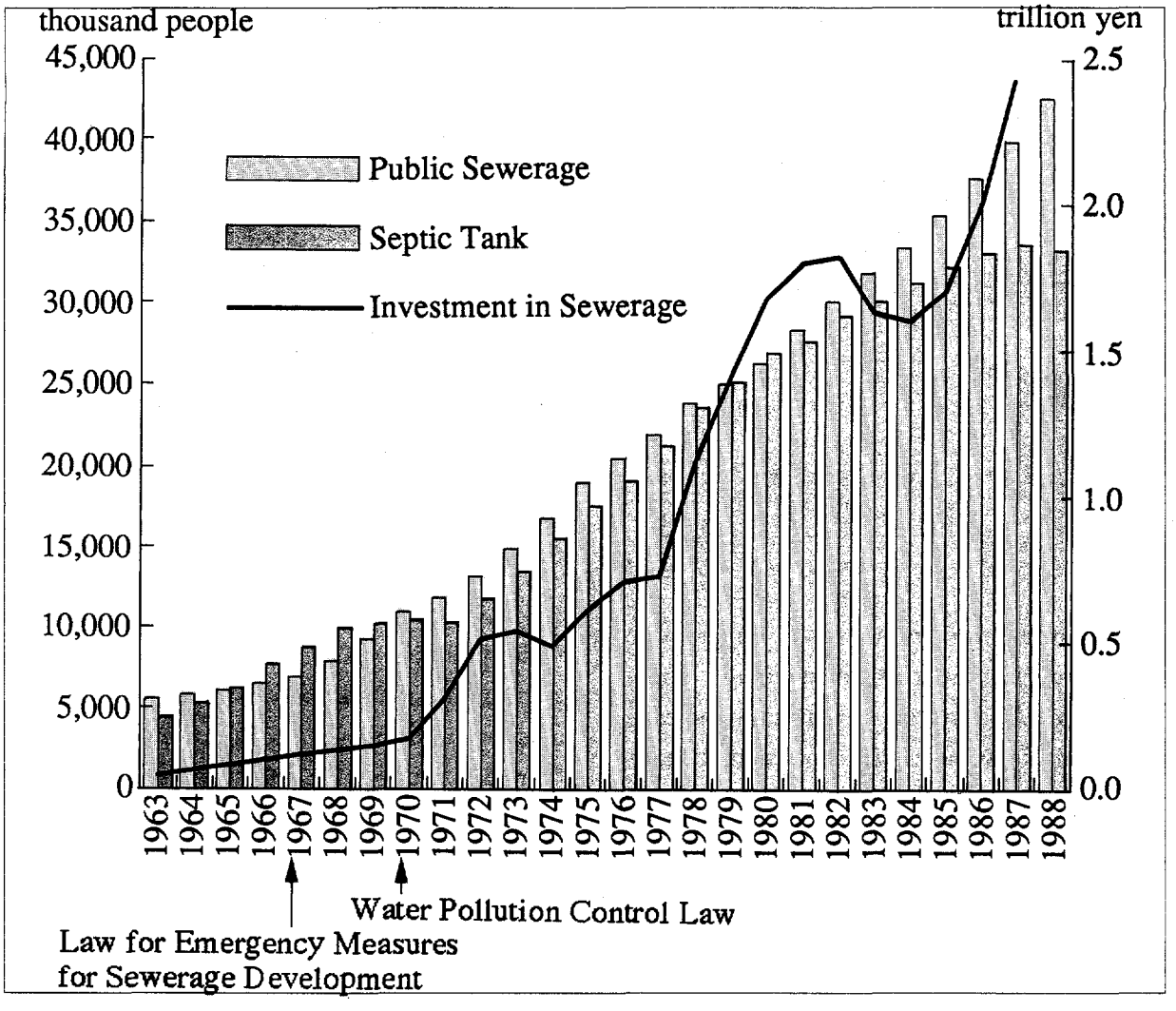


Figure 2.8: Access to Sanitation; Connection to Septic Tanks and Public Sewerage; and Investment in Sewerage 1963-1988

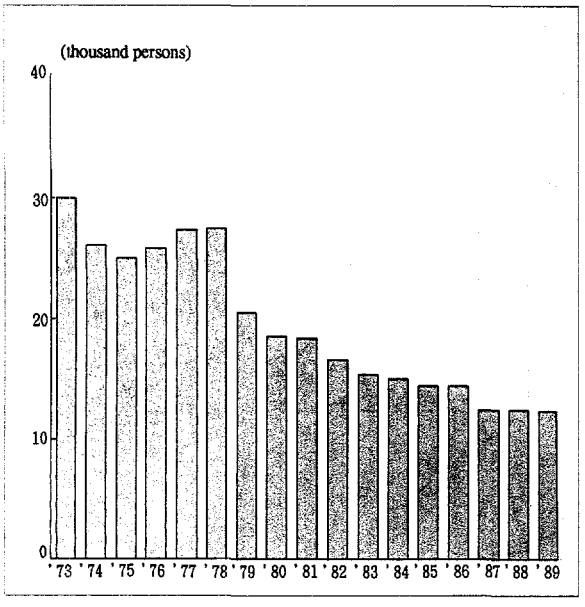
Source: Ministry of Health and Welfare

used, and in 1965 about the same number of people used this system as had access to sewerage. (For a description of the relevant technologies and costs see Annex 12, *Technologies for Night Soil Treatment and Septic Tanks.*)

In the 1980s to combat water pollution caused by wastewater from households (i.e., kitchen and washing uses), in areas without sewerage systems, local governments encouraged the adoption of the "combined septic tank" which can treat not only night soil but also household wastewater. Local governments have promoted combined septic tanks, and provided subsidies, including low interest loans to cover the difference between construction costs of combined and single-function septic tanks. At the present time one quarter of the septic tanks used in Japan are combined ones.

Development of sewerage systems in Japan had progressed, mainly in the large cities, until interrupted by World War II. The Sewerage Law of 1958 and the Sewerage Equipment Emergency Measure Law of 1967 provided the impetus for expansion of sewerage; invest-

Figure 2.9: Cases of On-The-Job Victims of Pollution 1973-89



Source: Japan Environment Agency

ments increased, and improved equipment was introduced. Introduction of sewerage often came after urbanization, substantially increasing its cost. Nevertheless, its expansion at a rate of about 1% per year, combined with reduction in factory effluents, has helped to achieve a substantial improvement in ambient water quality in Japan.

In the 1970s, demands for better facilities in the home (particularly flush toilets) began to exceed the rate at which sewerage schemes could be implemented. Domestic effluents therefore became a major source of water pollution. Given this background, small scale septic tanks, digester chambers and common treatment systems (subsidized by local governments with low interest finance) were established, and have continued to develop since the latter half of the 1970s in parallel with the more expensive sewerage systems).

Figure 2.8 shows the trend in numbers of households with access to sewerage or using septic tanks, as well as investment costs covering the period 1963-87. By 1990, collection of night soil and household wastewater by various means was as follows:

a) Households connected to a sewerage system.....36.4%

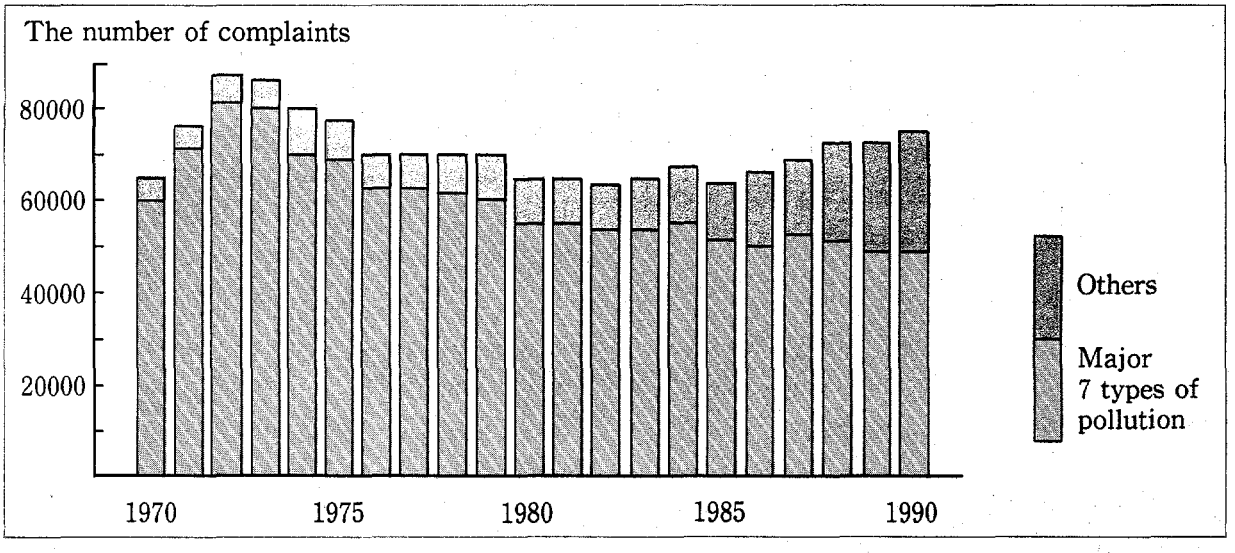
b) Households with combined septic tanks (including small scale sewerage systems)..... 7.1%

c) Households with single septic tanks.....20.3%

d) Households served by collection and treatment of night soil.....36.2%

This system continues to allow serious water pollution because untreated waste water from c) and d) (i.e., 56.5% of the total) is discharged into rivers. Local governments are therefore accelerating their efforts to ensure that all household waste water is collected either by sewerage or by use of combined septic tanks. Industrial wastewater may also be discharged into public sewers on condition that it meets certain standards of water quality. Indeed, industrial enterprises are required to connect to sewerage systems where they are available and where the quality of liquid waste is appropriate.

Municipal authorities charge fees for using the sewerage system depending on the volume of wastewater discharged. This is calculated, for domestic sewage, on the basis of overall water use of the household, in some cases using the monthly water bill as a proxy. They may also apply a progressive scale of fees, the greater the volume of wastewater, the higher the fee charged for each increment in volume.



Note:

The seven major issues are; air, water, noise, pollution vibration, soil pollution,odor and subsidence.

Figure 2.10: Pollution Complaints 1970-90

Source: Environmental Disputes Coordination Commission

The same generally applies to industrial wastewater discharged into public sewers, but in the case of industrial effluents, municipalities are authorized to charge an additional fee depending upon the quality of the wastewater, i.e., concentration levels of various pollutants and other indicators of water quality such as BOD and COD. Out of 825 public sewerage and sewage treatment systems surveyed in 1991, 637 employed progressive rates based upon volume discharged, and 60 levied special pollution or water quality charges.[6]

Progress and Challenges

Information on environmental trends is not precise, and the actual impact upon fundamental indicators of well-being, such as human health, are difficult to determine. Nevertheless, it is clear that Japan has made substantial progress in recent years in addressing pollution in its various forms, and in so doing, has improved the quality of life of its citizens. For example, urban water supply and sanitation facilities and solid waste disposal are handled extremely effectively, and major progress has been made in relation to various types of air, water, and noise pollution. One useful indicator is the number of cases of occupational ill-health caused by industrial pollution. The trend in this indicator since the early 1970s has been almost consistently downward, as Figure 2.9 shows.

Nevertheless, important issues remain unresolved. The number of citizens' complaints about the environment has remained relatively constant over the last twenty years. While reduction in actual environmental problems may to a large extent be offset by growing citizen awareness and willingness to complain, the large numbers involved (see Figure 2.10) leave no room for complacency. It is noteworthy that while complaints

about noise continue to be dominant, "other" issues are becoming more important; these include complaints about illegal dumping, amenity, aesthetics, and sunshine exclusion, and are those associated with a generally high standard of urban environmental quality.

A generic issue is that while the quality of individual emissions tends to show systematic improvement, total emissions (of water- or air-borne waste, or noise) have built up due to increased economic activity. This is illustrated by the various problems stemming from the rapid growth in automobile use. As in all other countries, these problems continue to grow year by year. Moreover, environmental damage caused by new chemicals, combined with the residual effects of toxic and hazardous wastes discharged from factories in previous years under less strict controls, poses increasing risks to water resources, soils, and human health.

As noted, Japan places heavy reliance on extremely expensive incineration for solid waste disposal. Final disposal of much industrial waste is still dependent on low-cost landfill using reclaimed land and inland sites. Few measures for waste reduction and recycling have been employed, and there are still many inappropriate waste disposal sites being used. Although increases in waste disposal fees have started to encourage recycling, and while the present quantity of waste treatment is manageable, the unused capacity of final disposal facilities is small. Solid waste disposal therefore continues to pose potential threats to soil and water resources. These are exacerbated by enforcement of air and water pollution control measures, since dust and sludge containing toxic substances has increased.

Footnotes:

[5] Details from Kazu Kato, The Use of Market-Based Instruments in Japanese Environmental Policy, mimeo, 1993.

[6] Source: Kazu Kato, op. cit..

Chapter 3: Institutional Responsibilities & Procedures for Environmental Management

Responsibility for environmental decision-making in Japan, as in all countries, falls to various levels of government. The overall governmental administrative structure as it relates to anti-pollution measures is shown in Figure 3.1. Features of key organizations are summarized below. The primary distinction is between national and local level governmental authorities, and their respective roles and responsibilities. Decision making processes at the national and local government levels, and between national and local governments are described. Details are also provided on the functions of agencies with specific environmental responsibilities. In this regard, the Japan Environment Agency is of course of prime importance, but the roles of the Japan Environment Corporation and other agencies are also discussed. Local government responsibilities, mainly concentrating on those of the large cities, which have powers and duties equivalent to the Prefectures, and a brief outline of some other organizations active in environmental work in Japan is presented. Organizational arrangements with regard to basin-wide planning are also discussed, and the chapter concludes with a summary of the range of environmental management instruments employed by the various government agencies.

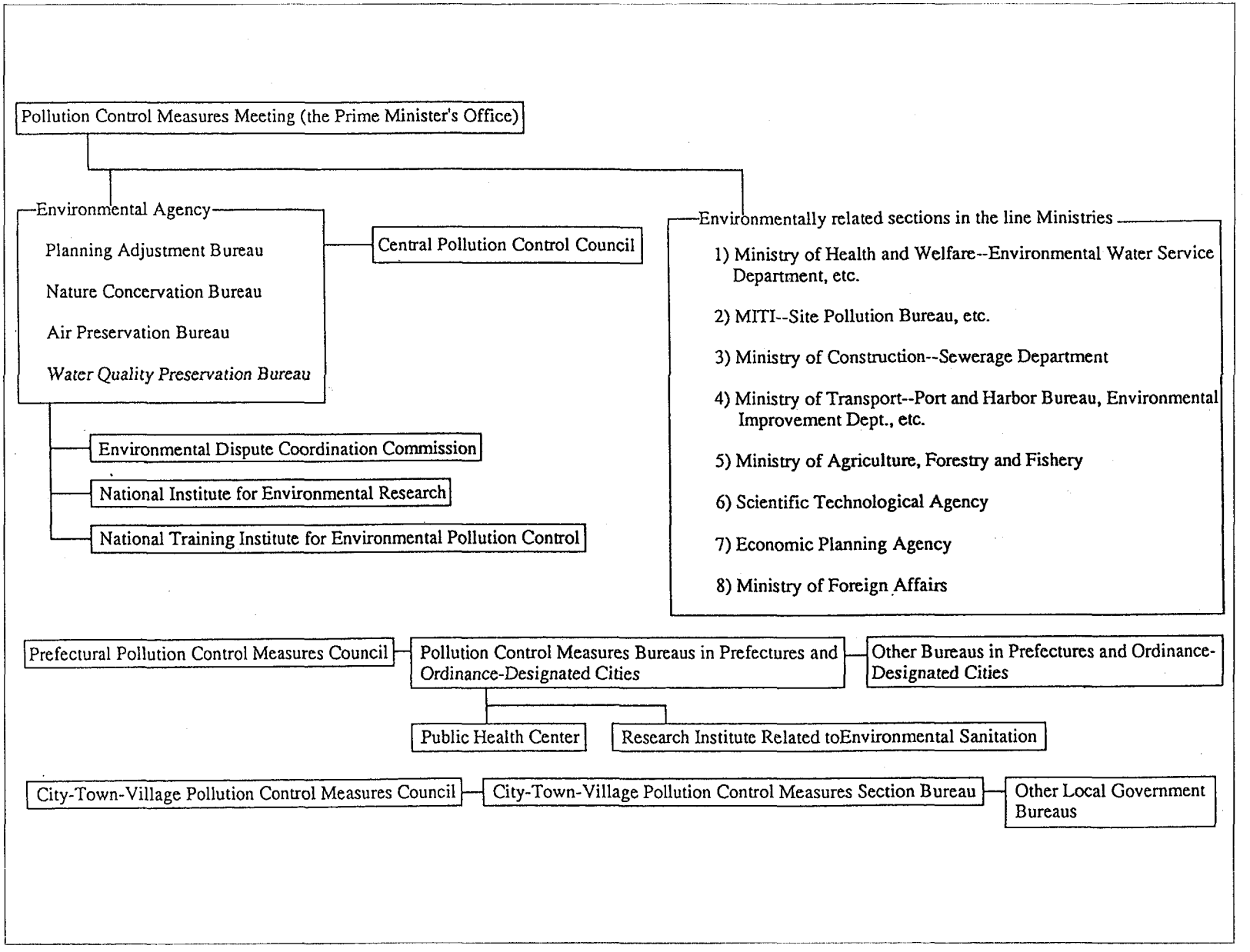
Pollution-related organizations in government can be divided roughly into two categories. First are those organizations established specifically for pollution control and environment. The second consists of units which have responsibility for pollution matters, but are located in government ministries and other agencies that have primarily non-environmental objectives. The former group includes the Japan Environment Agency, the Ministerial Pollution Control Measures Meeting, which is located in the Prime Minister's Office, and the Central Pollution Control Council. Although the Environment Agency is responsible for environmental administration in the country, the Pollution Control Meeting is the supreme decision-making agency, and ensures coordination of environmental measures with other policy measures.

The Japan Environment Agency

The Japan Environment Agency came into being on July 1, 1971, its overall mission being the promotion of environmental protection with a view to ensuring a healthy and civilized life for the people of Japan. Its general responsibilities include the planning, drafting and promotion of basic policies relating to protection of the environment; overall coordination of the various branches of the Government responsible for environmental protection; coordination of budgetary policies for pollution control-related expenditures; and centralized management of appropriations for environmental research and development. Both nature conservation and pollution control fall within its jurisdiction.

The head of the Environment Agency, the Director General, is appointed to the Cabinet with the rank of a Minister of State. When the Director-General deems it necessary for the protection of the environment, they have the power to request information or explanations

Figure 3.1: Overall Administrative System for Pollution Control



Source: Japan Environment Agency

from the heads of other administrative agencies. The Director-General is also empowered to make recommendations to them with respect to important matters.

As shown in Figure 3.2, the Agency comprises four bureaus: 1) Planning and Coordination, 2) Nature Conservation, 3) Air Quality and 4) Water Quality; and two departments: 1) Global Environment and 2) Environmental Health, in addition to Minister's Secretariat. The Agency is subdivided into 24 divisions, and nine offices, employing a total of 921 civil service personnel as of March 1991.

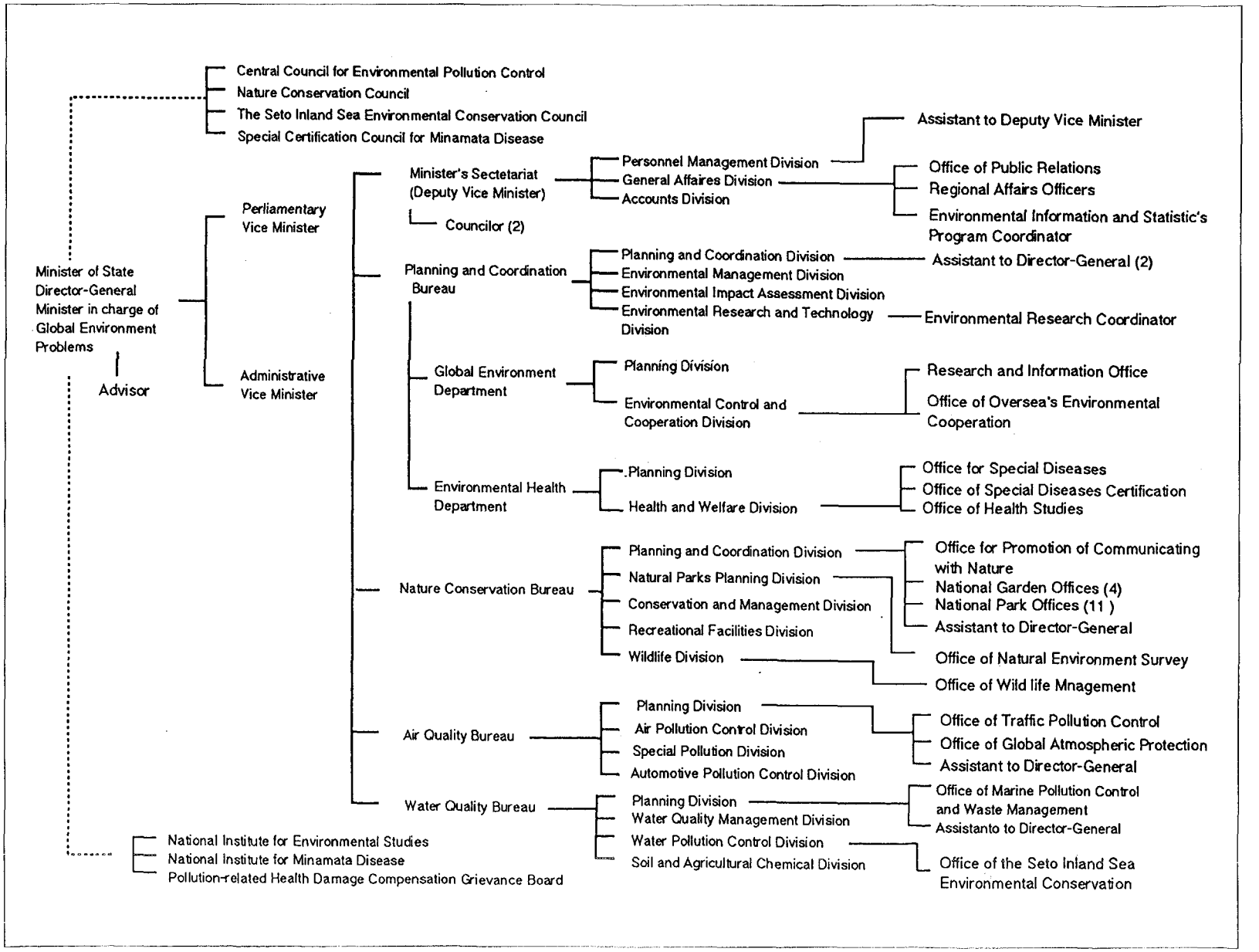
The Planning and Coordination Bureau is responsible for planning and implementation of basic policies relating to environmental protection and overall coordination of environmental protection measures undertaken by Government agencies concerned. This includes responsibility for environmental impact assessment, specifically 1) basic policy planning and promotion of environmental impact assessment, 2) overall coordination of related works in environmental impact assessment by agencies concerned, and 3) scientific and technical questions concerning environmental impact assessment and examination and guidance in specific cases.

In addition, the Bureau is responsible for a number of other subjects, including supervision of the Japan Environment Corporation, preparation of the annual report on the quality of the environment and long-term environmental conservation program, formulation of basic policies concerning regional pollution control programs, and general management of National Institute for Environmental Studies. The Planning and Construction Bureau also includes the Global Environment Department, which is responsible for planning, promotion and comprehensive coordination of fundamental policies on global environmental problems and for international cooperation in the field of the environment; planning, promotion, and comprehensive coordination of policies on specific problems such as global warming and deforestation, and programs of studies and research on global environment.

Also included is the Environmental Health Department which was created to assure full enforcement of the law on Pollution-Related Health Damage Compensation that was enacted at the 71st session of the Diet, and other tasks including certification of pollution victims, scientific determination of causes of health damage caused by pollution and payment of compensation to pollution victims.

The Air Quality Bureau is responsible for establishing environmental quality standards and the enforcement of the various pollution control laws relating to pollution caused through atmospheric media, namely, air-pollution, noise, vibration and offensive odor. It administers services relating to the establishment of emission standards, and the proper use of fuel to control air pollution. The Water Quality Bureau is charged with establishing environmental water quality standards, and enforcing standards controlling water pollution, ground subsidence and soil contamination. Included within its jurisdiction are administrative services relating to the treatment of industrial and domestic wastes, and those related to the control of agricultural chemicals.

Figure 3.2: Organization of Japan Environment Agency



Source: Japan Environment Agency

As noted earlier, at the time of its establishment the Environment Agency was staffed mainly by personnel transferred from government agencies having special interest in specific environmental problems; and in practice major positions were occupied by staff from the authorities heavily involved with the environmental issues concerned. This situation has now changed, and although the Environment Agency has gradually assumed leadership in environmental matters, its ability to carry out policy measures is clearly limited by its subordinate position in relation to other ministries.

Other National Level Institutions

The Japan Environment Corporation (JEC)

One of the most important instruments of environmental management in Japan, the JEC (known until 1992 as the Environmental Pollution Control Service Corporation) exists to provide technical and financial support to private industry in addressing environmental problems. Financial support is also provided by the Japan Development Bank and the Small and Medium Enterprise Finance Corporation. Further details of the role of these agencies are provided in Chapter 5.

Other agencies include The National Institute for Environmental Studies which is attached to the Environment Agency. Its mandate includes environmental research, including specific issues related to global environmental problems and regional development problems as well as fundamental and exploratory studies. To support these research activities three Centers: the Environment Information Center; the Center for Global Environmental Research; and the Training Center for Environmental Affairs are attached to the Institute. This training system for pollution control is in addition to the sanitation training system operated by the National Sanitation Institute and the Environmental Sanitation Center. The National Institute for Minamata Disease is another research institute attached to the Environment Agency. This institute carries out clinical research relating to the method of medical treatment for the Minamata disease, and basic medical research concerning the Minamata disease, such as epidemiological investigations and studies.

Environmental Responsibilities in Line Ministries Together with organizations specifically designed for environmental purposes, existing authorities have also expanded their activities to address environmental problems. For example, in the Ministry of Construction departments have been established to deal with measures against noise concerning road traffic and car exhaust gas and with environmental problems due to road construction. Another deals with the environmental preservation and restoration of rivers, lakes, swamps, and water quality along the coastline. Other departments deal with municipal sewerage and sewage disposal, urban planning and noise.

The Ministry of Transport has also became active in dealing with traffic pollution such as aircraft and Shinkansen noise, and marine contamination due to land reclamation, port-and harbor environment and vessels. The Ministry of Agriculture, Forestry and Fishery promotes

pollution control in order to preserve agricultural irrigation water and the living environment in agricultural and fishing villages. The Ministry of Health and Welfare, which has traditionally been responsible for water supply, sewage disposal, solid waste and hygiene, continues to be active in assisting local governments in these areas.

The Ministry of Home Affairs extends financial aid to municipalities for environmentally related work and projects. The Scientific Technological Agency handles technological development and nuclear power work. The Education Ministry is in charge of subsidiaries for environmental scientific research and the establishment of related universities. In addition, the Foreign Ministry provides financial aid and technical assistance to address environmental problems in foreign countries.

Among them all, the MITI has become the most heavily involved in Japan's pollution problems, together with the Environment Agency. The MITI has encouraged pollution control measures in industry in many ways, including negotiations over standards, financing mechanics, and technology development.

In addition to the environmental research institutions mentioned earlier, relevant research in other Ministries or institutions affiliated with them includes programs in the Meteorological Agency on climate fluctuation and the atmosphere; in the Public Works Research Institute; in the Construction Ministry on environmental issues related to water and roads; and in the Environmental Resource Research Institute on resources and energy. The Industrial Technology Institute of the MITI also develops industrial pollution control technology and technologies for enhancing efficiency in energy and water use.

National Level Decision Making Structure for Industrial Pollution Control

The policy-making structure for industrial pollution-related measures is consistent with general industrial policy-making procedures in Japan. The central government makes decisions on national measures in cooperation with national industrial groups and with affected local authorities. Where policy is developed at the local level, negotiations take place between the local government and the local industry, which itself often involves the relevant national industrial organization. Taken together, these measures achieve cohesion between national and local policies, as well as between government and industry.

For the past 40 years, with the Liberal Democratic Party until recently almost continually in power, the Diet has had little influence on decision making for national measures. Most of the measures have been submitted as government proposals and already developed within the administration. With regard to environment, the policies in which the Diet became involved were limited to the period when pollution-related laws were instituted around the late 1960s and early 1970s. All the others have been led and developed by the administration. Therefore, in developing Japan's national policies, the decisions arising from negotiations within the administration are key to the whole process.

Anti-pollution initiatives are primarily developed by the Environment Agency which negotiates with the industries involved, and with relevant Ministries and government offices in charge of public works and which have responsibility regarding the proposed measure. The Environment Agency generally consults MITI first of all and then submits the amended proposal to the competent authorities such as the Ministries of Construction and Transport for further review.

Following this review and amendment process, the Environment Agency refers the revised proposal to a consensus-building instrument, namely the Central Pollution Control Council, which consists of representatives from academia, industry, citizens' and workers' groups, and local government. The proposal is then submitted to the Pollution Control Measures Meeting, to be finalized as national policy or legislation. This Meeting, comprised of the Prime Minister's Office (the Prime Minister is chairman) and the Ministers of related authorities makes the ultimate decision. However, almost all substantive work has been completed before the measure is submitted.

While negotiating with other authorities concerned as described above, the Environment Agency consults the pollution and environmental departments in local governments. The local authorities take into consideration the relevant industrial group that will be influenced by the measure, their way of the dealing with it if the business should be affected by the measure, financing and cost-sharing arrangements, and other assistance to cope with it. They then convey their views to the Environment Agency.

The process of negotiation and consensus building is in practice absolutely necessary prior to acceptance by the government or submission to the Diet. The Environment Agency generally tries to propose measures and develop them with the support of public opinion, local government and mass media, while other governmental departments concerned, at both the national and the local level, consult the business interests which will be affected by the measure, and ask the relevant section committee of the ruling party for its support. Without cooperation from the ruling party the measure cannot in practice be proposed to the Diet.

The above approach has been extremely effective in forming a cooperative approach by the authorities concerned and in steadily developing measures which are certain to be implemented in practice. But on the other hand this has led to a mechanism where policy is decided with established environmental ideas which make it difficult to take positive action and make policies in advance. It has in other words tended to be a reactive policy only; this is a limitation of the consensus building approach.

Another aspect of Japan's anti-pollution measures is that they have been incorporated in national land urban and industrial policies and developed as a whole within those policies rather than treated as separate anti-pollution measures. This is clearly demonstrated in the mid-term 5-year Economic Plan and National Comprehensive Land Improvement Plan, and the Multipurpose Land Development strategy. The latter affects the subordinate Urban Development Plans, and

concerned local governments are involved in drawing it up. This has also been influential in guiding industrial sites and population movements both nationwide and in urban areas and in making rules for traffic, energy, water resources and other regional development.

Environmental Responsibilities in Local Government

Forty-seven prefectures and nearly 3,000 cities, towns and villages have local self-governing bodies. Local governments covered in this report refer primarily to the prefectures and their equivalent, the ordinance-designated large cities. The prefectures have some organizational units which correspond to and deal with national level environment units. These include Construction Bureaus which correspond to the Rivers and Roads Bureau in the Construction Ministry, and Environmental Sanitation Bureaus for relevant matters handled by the Environment Agency and the Ministry of Health and Welfare. They also have Planning Adjustment Bureaus which handle overall strategic planning; Industrial Economy Bureaus which primarily deal with industrial promotion, and City Planning Bureaus which deal with municipal planning, which typically includes environmental issues. Prefectural institutions also monitor industrial and urban pollution and perform regulatory functions including establishment of local standards; they also provide technical assistance to secondary cities, towns and villages within their jurisdiction. Staffing of local government environmental activities is summarized in Annex 13, *Staffing of Local Government Environmental Activities.*

Cities, towns and villages have always taken primary responsibility for basic environmental sanitation, and continue to be responsible for sewage collection, treatment and disposal. As observed in Chapter 2, roughly one third of the households in Japan have access to sewerage, about the same number rely upon night soil collection, and the remainder use septic tanks. In each case, the local government is responsible for management of the operations, although actual collection may be delegated to private contractors. The same kind of arrangement applies to solid waste; again, local authorities have overall responsibility, but private contractors may also be involved.

With these traditional responsibilities, local governments were readily able to adapt their skills to cope with urban and industrial pollution. Prefectures and larger cities have assisted in the solution of technical problems, and engaged in training activities on behalf of small and medium sized cities, towns and villages, and also developed national measures in the regions in which they are located. In fact, the eleven large ordinance-designated cities such as Yokohama, Osaka, and Kitakyushu are given as much authority and obligations as the prefectures with regard to industrial and urban pollution, and in addition are directly responsible for implementation of pollution control measures. Some of the smaller cities, with populations of less than one million, have also been granted these powers and duties.

Local government attitudes toward pollution problems tend to differ from those of the national government for several reasons:

- As distinct from the national government, local governments deal directly with anti-pollution measures, and have to respond directly to citizens' complaints;
- As the leaders are selected by the citizens, they are obliged to be aware of trends in public awareness toward pollution; and
- Local authorities' environmental departments negotiate directly with local industry to set their own standards and goals, and (step-by-step) stricter standards. They are not, as at the national level, subjected to major influence from MITI. However, in arriving at Pollution Control Agreements between the local administration and individual enterprises, businesses at the local level consult the relevant nationwide organization (e.g., the Electric Power Project Association or Steel Association) to make sure that the local standards do not exceed the nationwide ones.

Relationships Between National and Local Governments

The national government has significant influence on local governments' measures because it takes the initiative in national land planning, industrial site policies and major infrastructural improvement plans such as traffic, energy and water resources, as well as having the power to subsidize and issue bonds for local public works. However, Diet members elected from the local district can monitor administration of subsidies (the central government's intervention to the local administration using subsidies as a weapon and its arbitrary induction), enabling local government leaders directly selected in the election, especially the prefectural governors and the leaders, to use their own discretion to a large extent.

The importance of local government with regard to pollution matters has continued to increase. For example, the Environment Agency regularly exchanges opinions and makes adjustments on measures with the relevant Bureaus in the local government, and reflects local governments' opinions on ambient and effluent standards, as well as designation of regional pollution control plans.

From 1960 to the mid-1970s, when anti-pollution measures by industry were at their height, collaboration between the MITI and industry played an important role in establishing the nation's ambient and effluent standards. But the national government's influence through the industrial measures has become weaker as industry has started to take longer term measures and each industry has dealt with environment as one of it business activities. Instead, the local governments, which have had great contact with direct environmental measures such as factory sites and its expansion, have become increasingly influential.

Local governments are capable of using their discretion to a fairly large extent in environmental matters, but these are restricted to industrial and urban pollution measures. As for large scale works such as land reclamation, trunk roads, railroads, port and harbor construction, and water resource developments, all of which may threaten the natural environment, the national government is in control of

the environmental impact assessment process (see Chapter 4 for further discussion). This, plus the fact that the great area of nationally-owned land is located along the coast and among the mountains, severely limits the power of local governments. This is one of the reasons why natural environmental resources, especially along the coast, are being destroyed even as urban and industrial pollution is being considerably improved.

Other Organizations Involved in Pollution Control Activities

In addition to national and local governments, many other organizations influence Japanese environmental policy. These include semi-public organizations for regional development such as the Housing/Urban Development Corporation and the Regional Promotion and Development Corporation. These institutions play important roles in large-scale development of housing and industrial parks, and in developing urban infrastructure, through development of housing and industrial districts.

There are also a number of foundations and other non-profit organizations aimed at promoting the achievement of specific social objectives approved by national and local governments. These include the Environmental Health Center for promotion of training and technological development, and the Japan Environment Association for diffusion of environmental education. Other organizations promote certain public causes among industrial and commercial enterprises. In this category are to be found industrial associations such as the Petro-chemical Federation and Federation of Iron and Steel Industry, and Consulting Association for Water and Sewerage. The Industrial Machinery Promotion Association has played a particularly important role in developing pollution control technology and unified views among industries for national pollution control policy.

Labor unions, women's groups and consumers groups have also been important. Labor unions have been concerned for many years about working conditions, and specifically work-related accidents. Until the mid-1960s, however, they had seldom taken action with regard to industrial pollution. Since that time, industrial labor groups, led by those in the chemical industry in which the most serious occupational health damages have occurred, have promoted a series of measures in cooperation with academics and residents' groups. Consumer organizations have also become increasingly involved in pollution issues with actions to promote public health through consumer education and by pressuring companies to produce environmentally benign consumer goods.

In recent years academic and legal groups have become increasingly important in assisting anti-pollution activities. For example, local school teachers led movements against construction of the Mishima-Numazu industrial complex, as well as the industrial activities which caused Yokkaichi asthma. However, although individual scholars, teachers, lawyers and medical doctors participated in early anti-pollution movements and contributed their skills, formal academic or professional groups

generally provided assistance only after the movements had been established by popular will. Professional groups therefore tended to have been followers rather than leaders.

Basin-Wide Planning

The Ministry of Construction has primary responsibility for basin-wide water resource planning. Acting mainly through its River Basin Bureau, it has traditionally given priority to actual use of river water, and integrated and multi-purpose water resource development, including municipal and industrial water supply, agricultural water use, hydroelectric power, and flood control. However, in recent years, it has become increasingly concerned with pollution issues. While the Ministry's Urban Planning Bureau (Sewage Division) handles municipal issues, the River Basin Bureau collaborates with it in basin-wide sewage and pollution matters. Central to this is the program known as the Comprehensive Basin-Wide Planning of Sewage Systems (CBPSS) [7].

The Japanese Sewage Law states that master plans for sewer systems should be drawn out for the bodies of water where water quality standards are set by the Basic Law for Environmental Pollution Control. The objectives of the master plans are to satisfy water quality standards by reducing pollutants from various sources in the basins by measures such as sewer system construction. Because of this, CBPSS has been implemented since 1971. As of the end of fiscal 1992 (March 1993), master plans have been authorized by the Construction Minister for 73 basins and water bodies in Japan. CBPSS is a supreme master plan in which present and future pollutants from all sources are calculated for river basins or other water bodies. CBPSS serves as a framework when the necessity for the construction of sewage systems in a planning area is evaluated.

The planning area for CBPSS is basically the whole basin of the water body, however, for practical reasons, adjacent areas could be incorporated depending on present and prospective land use. BOD is used as the index in river basins whereas COD is used for lakes and coastal areas. If standards are set on Nitrogen and Phosphorus in lakes, they are also used as indices.

Sewage departments in prefectures take care of CBPSS in cooperation with planning, river, agricultural, environmental and financial sectors. Steering committees composed of relevant sectors and scholars are organized especially when the basin covers more than two prefectures.

The main points to be determined in a CBPSS are: 1) Basic Strategy to construct sewage facilities, 2) The areas to be covered by wastewater treatment systems, 3) Location, design and capacity of major sewage facilities in the above area, and 4) Priority for construction of sewage systems in the area. Components of CBPSS implementation are basic survey, calculation of pollution loads followed by pollution analysis and sewage planning. These components are described in Annex 14, *Comprehensive Basin-Wide Planning of Sewage Systems.*

The proposal by Ministry of Construction that large scale treatment facilities should be con-

Table 3.1: Environmental Management Instruments

Features	Features
1. Environmental and effluent standards	■ Consideration of the capacities of the three parties: citizens, governments and enterprises. ■ Enforcement of government environmental and effluent standards. ■ Supplementary provisions by local governments to national standards for emissions of gas and waste water. ■ Designation of water system and regional categories for establishment of standards. ■ Phasing of regulations and standards. ■ Voluntary observance standards for private companies in pollution control agreements.
2. Introduction of Pollution Control Program	■ Environmental pollution control programs (designated areas for pollution control). ■ Environmental Impact Assessment Procedure.
3. Education/Training/Self Control in Industry	■ System for managers in charge of pollution control. ■ Training system for pollution control. ■ Establishment of guidelines and organization of technical training. ■ Environmental education.
4. Monitoring and Guidance	■ Development of monitoring system. ■ Obligation for on-the-spot inspection and submission of information.
5. Financial Support	■ Special taxation measures (special depreciation, reduction and exemption from tax).
6. Technical Support and Development	■ Joint Technology development and financial support for development. ■ Technical guidance and support.
7. Pollution Control Projects	■ Public works for sewage/water supply construction and management. ■ Works for waste disposal. ■ Cooperative works, collective facilities to dispose industrial waste, relocation works, construction of buffer green zones.
8. Compensation Schemes	■ Basin-wide planning. ■ Environmental dispute coordination commission. ■ Pollution related Health Damage Compensation Law. ■ Law concerning Entrepreneurs' Bearing of the Cost of Public Pollution Control Works.

structed at the mouth of rivers, was against by citizens and scholars in terms of the following points:

- 1) water flow in the middle and lower reaches is reduced and river environment deteriorates,
- 2) large scale sewerage system may not enable municipalities in the river basin to take their own measures considering local conditions; and
- 3) the cities in the upper stream cannot use the sewerage system until the trunk sewers are constructed. These objections have led to opposition movements to large scale sewerage construction and increased public awareness of protection of river environment. Also the sewerage planning such as dispersion of wastewater treatment plants can be seen considering the above points.

In practice, the CBPSS still has a number of shortcomings. For example, there have been occasions in which waste water management has had adverse environmental consequences. Actual projects have not always recognized the possibility that conveyance of waste water to treatment plants at the mouth of rivers may, by reducing river flow, also reduce dilution factors, to the detriment of river quality. Basin management plans should also be closely integrated into overall land use plans, including urban, forest and agricultural uses. However, the CBPSS as currently defined focuses predominantly on sewer system development, and other activities in the river basin tend to be taken as established data; optimal planning obviously requires a more comprehensive approach to be employed.

Summary of Governmental Instruments

It will be apparent from the foregoing that public authorities at the national and local levels in Japan have a wide variety of instruments at their disposal to assist in the management of pollution control activities. These are summarized in Table 3.1. (A more detailed form of this Table is in Annex 1, *Summary of Government's Environmental Management Instruments*.) Local and national governments address environmental issues in three main ways. First, they develop ambient and emission standards, issue regulations, and provide for penalties in the event that the regulations or standards are not observed. Second, they provide many forms of technical and financial assistance to private industry and individuals in order to encourage improved environmental behavior, or to ameliorate the social and economic effects of polluting activities. Third, they actually plan, construct and operate pollution control projects or associated facilities. These various methods are discussed in more detail in the next two chapters.

Footnotes:

[7] The following is taken from "Comprehensive Basin-Wide Planning of Sewage Systems", by Hidetoshi Kitawaki in *INTEP Newsletter, No. 2 June 1993*.

General Responsibilities

The Basic Law for Environmental Pollution Control, enacted in 1967, was followed by a series of legal and regulatory measures, which involved, *inter alia*, the establishment of specific emission and ambient standards. Of major importance were the Air Pollution Control Act of 1968, the Water Pollution Control Act of 1971, and the Noise Control Act of 1970. National and local governments as appropriate are required to establish scientifically based environmental standards or targets, and revise them periodically if necessary. Environmental quality standards for air, water, and noise have already been established at the national level, and standards relating to soil pollution are presently being considered. Although environmental standards do not have any actual legal enforcement power, they are extremely important in determining relevant emission standards.

The national government establishes environmental quality standards to protect human health and to preserve the living environment. For protecting human health, uniform standards prevail throughout the country. Although national ambient standards have been established for the living environment, different standards are applicable in different situations. Prefectural governments are empowered to place locations in various categories for this purpose, depending on local conditions such as the amount of residential housing, type and concentration of industry, and so on. Local governments have therefore been allowed to set up stricter standards than the national ones, and in practice this has been the tendency throughout Japan.

Along with environmental quality standards, national level effluent standards for air pollution, water pollution and noise emissions have been enacted. These standards are categorized by area, type of pollution source, and dependence upon their relationship to existing or new facilities. Also, many local governments have established stricter emission/effluent standards by ordinance or regulation. Furthermore, local governments have concluded pollution control agreements with individual private enterprises and thereby secured implementation of stricter pollution control measures.

In order to meet the given ambient standards, emission control is determined by setting up emission standards at the following three levels:

Level 1: The common nationwide standard determined by the central government.

Level 2: More stringent standards determined at the prefectural level.

Level 3: Emission reduction targets set up by each individual large-scale industry under agreements between the local government and the individual factories.

This system has functioned effectively to meet varying emission standards at the regional level.

As in the case of ambient standards, emission standards are determined first at the national level. The standard first categorizes sources of pollution by kind and scale, and sets up the allowable degree of emission, effluent,

Table 4.1: Emission Standards for Harmful Substances (June 1971)

Substance	Facility	Standard value
Cadmium and its compound	Baking furnace and smelting furnace for manufacturing glass using cadmium sulfide or cadmium carbonate as raw material	1.0 mg/Nm^3
	Calcination furnace, sintering furnace, smelting furnace, converter and drying furnace for refining copper, lead or cadmium	
	Drying facility for manufacturing cadmium pigment, or cadmium carbonate	
Chlorine	Chlorine quick cooling facility for manufacturing chlorinated ethylene	30 mg/Nm^3
	Dissolving tank for manufacturing ferric chloride	
	Reaction furnace for manufacturing activated carbon using zinc chloride	
	Reaction facility and absorbing facility for manufacturing chemical products	
Hydrogen chloride	Same as above	80 mg/Nm^3
	Waste incinerator	700 mg/Nm^3
Fluorine, hydrogen fluoride, and silicon fluoride	Electrolytic furnace for smelting aluminum (Harmful substances are emitted from discharge outlet)	3.0 mg/Nm^3
	Electrolytic furnace for smelting aluminum (Harmful substances are emitted from top)	1.0 mg/Nm^3
	Baking furnace and smelting furnace for manufacturing glass using fluorite or sodium silicofluoride as raw material	10 mg/Nm^3
	Reaction facility, concentrating facility and smelting furnace for manufacturing phosphoric acid	
	Condensing facility, absorbing facility and distilling facility for manufacturing sodium tripoli-phosphate	
	Reaction facility, drying facility and baking furnace for manufacturing sodium tripoli-phosphate	
	Reaction furnace for manufacturing superphosphate of lime	15 mg/Nm^3
	Baking furnace and open-hearth furnace for manufacturing phosphoric acid fertilizer	20 mg/Nm^3
Lead and its compounds	Calcination furnace, convertor, smelting furnace, and drying furnace for refining copper, lead, or zinc	10 mg/Nm^3
	Sintering furnace and blast furnace for refining copper, lead or zinc	30 mg/Nm^3
	Smelting furnace, etc. for secondary refining of lead, for manufacturing lead pipe, sheet, wire, lead storage battery or lead pigment	10 mg/Nm^3
	Baking furnace and smelting furnace for manufacturing glass using lead oxides as raw materials	20 mg/Nm^3

Note:

Prefectures may, by decree, set more stringent standards.

and noise for each categorized facility. For example, soot and smoke emission facilities, which are defined in the Enforcement Ordinance of the Air Pollution Control Law, includes 28 kinds of equipment such as boilers, heating furnaces, and waste incinerators. Separate emission standards, varying according to size of the facility, are determined for each type of equipment. For example, standards pertaining to certain harmful substandards are as set out in Table 4.1.

To achieve a smooth application of derived emission standards to the designated facilities, the following transitional measures were originally taken:

- for factories for which it was difficult to immediately meet the given standards, a 2 to 5 year grace period was given and lower standards were sometimes permitted on a temporary basis; and
- enforcement of the new effluent standards was initially limited to the largest effluent dischargers, and then gradually extended to smaller-sized factories.

In general, the governing principle has continued to be that improvement in standards is gradually carried out taking into account technological progress as well as the financial capacity of the relevant industries.

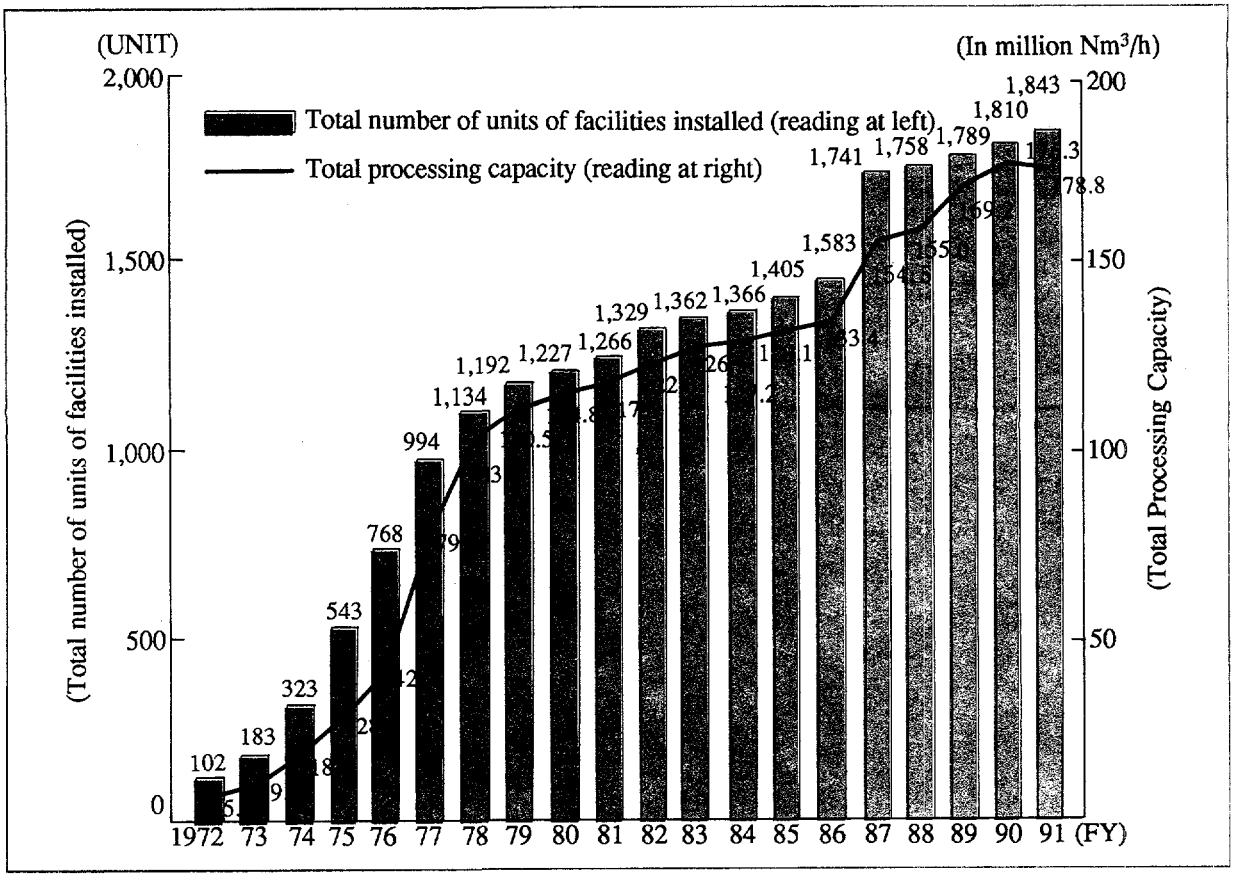
Air Quality Standards

Environmental or ambient standards for air quality, originally introduced in 1968, relate to

Table 4.2: Ambient Air Quality Standards

Substance	Standard Values	Measuring Methods
Sulfur dioxide	Daily average of hourly values shall not exceed 10ppm, and hourly values shall not exceed 2ppm.	Conductometric method
Carbon monoxide	Daily average of hourly values shall not exceed 10ppm, and average of hourly values in eight consecutive hours shall not exceed 20ppm.	Nondispersive infrared analyzer method
Suspended particulate matter	Daily average of hourly values shall not exceed 0.10 mg/m3, and hourly values shall not exceed 0.20 mg/m3.	Mass/concentration method based on filtration collection. Alternatively, the light-scattering method, the piezo-electric microbalance method, or the Beta-ray attenuation method yielding results linearly related to the values of the mass/concentration method.
Nitrogen dioxide	Daily average of hourly values shall be within the range between 0.04ppm and 0.06ppm or below.	Colorimetry employing Saltzman reagent (with Saltzman's coefficient being 0.840).
Photochemical oxidants	Hourly values shall not exceed 0.05ppm.	Absorptiometry using neutral potassium iodide solution, or coulometry.

Figure 4.1: Installation of Exhaust Desulfurization Facilities 1972-91



Source: Japan Environment Agency

Notes:

1. Surveyed by the Environment Agency.
2. The figures for FY1982 and the preceding years are those as of January 1 of the given year, whereas those for FY1983 and the subsequent years are those as March 31 of the given year.

five polluting substances (see Table 4.2). Emission effluent standards were established for specific facilities and types of equipment at this time. Environmental standards for NO_2 were revised in 1978, when the 0.04-0.06 ppm daily average requirement was relaxed. For details of how this revision was arrived at, see Annex 8, *Case Studies in Government Decision Making: Evolution of The Basic Law for Environmental Pollution 1967, and Revision of NO_2 Standards, 1978.*

The national government designates special areas where, due to the large number of factories and business establishments, strict adherence to emission standards will not be sufficient to achieve environmental standards. In these areas, local governments establish total emission reduction programs and implement total emission controls. In Tokyo, Yokohama and Osaka, total emission control began in 1982 and has been applied to existing factories and business establishments since 1985. By 1990, a total of 24 total emission control areas had been designated. Increasingly strict emission control for individual industrial plants, often according to pollution control agreements, has taken

place in these and in other areas. This is exemplified by investment in desulfurization facilities, and by the introduction of low NOx combustion technology and improvement of denitrification facilities, as depicted in Figures 4.1 and 4.2.

Under the Air Pollution Control Law, the Environment Agency has the power to determine limits of exhaust gas, and has gradually strengthened NOx controls with regard to vehicle emissions since 1973, as shown in Table 4.3. However, due to opposition from the transport industry, progress has not been as rapid as hoped. Emission controls for diesel vehicles and large lorries was delayed, and they only apply to new cars. However, although the number of cars has doubled, a combination of emission controls, improved traffic management and mass transit systems has stabilized the level of NOx over the last twenty years or so.

As shown in Table 4.4, in comparison with other major industrialized countries, Japan's ambient air quality standards are relatively high; this applies in particular to SO_2 and SPM. CO and NO_2 standards are less strict. However, it is important to re-emphasize that the national standards are typically exceeded by locally determined ones.

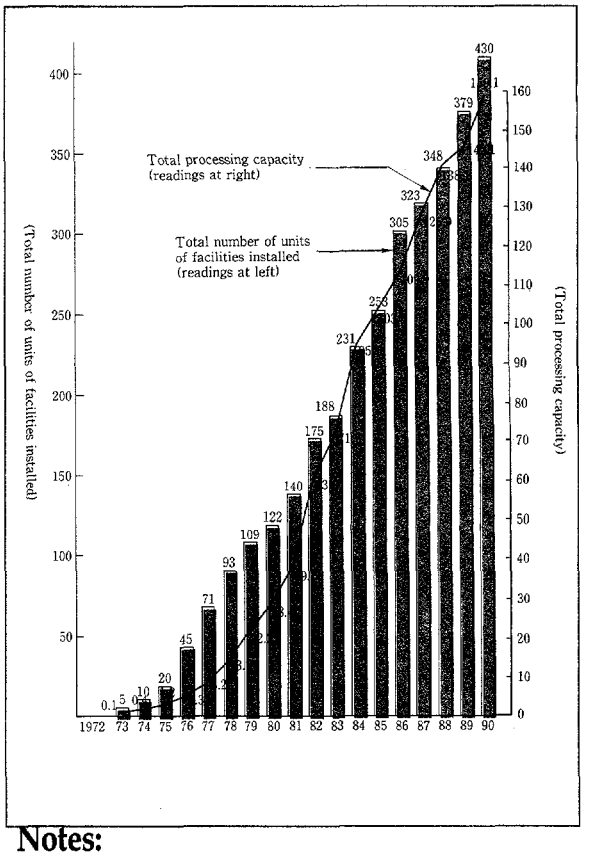


Figure 4.2: Installation of Exhaust Denitrification Facilities 1972-90

Notes:

1. Surveyed by the Environment Agency.
2. The figures for FY 1984 and the subsequent years are based on the reported data pigeonholing project associated with facilities which emit soot.
3. The figures for FY1982 and the preceding years are those as of January 1 of the given year, whereas those for FY1983 and the subsequent years are those as of March 31 of the given year.

Water Quality Standards

Environmental or ambient standards are prescribed for water quality items relating to human health, and items relating to the preservation of the living environment. The former, which determine the maximum allowable levels of polluting substances such as cadmium and mercury are equally applied to all public water bodies throughout the country. The latter, such as pH and BOD are determined according to type of water body (river, lake, sea, etc.) as well as by water use.

With regard to human health, environmental standards for eight substances were set in 1971, thereafter being periodically revised,

Table 4.3: NOx Emission Controls for Vehicles

Classfication of autos			Types of exhaust gas		Controls in force: Mean Value	Controls in force: Year Enforced	Short-term Target: Target Value	Short-term Target: Year Enforced	Short-term Target: Reduction Rate	Long-Term Target: Target Value	Long-Term Target: Reduction Rate
Diesel	Trucks・Buses	Light weight avtos (GVW : -1.7tons)	Nitrogen Oxide (NO_x)		0.9g/km	1988	0.6g/km	1993	△33%	0.4g/km	△56%
			Particulate Matter (PM)		— — — —		0.2g/km		— — —	0.08g/km	△60%
		Medium-woight autos (GVW : 1.7-2.5tons)	NO_x	Direct Injection	380ppm	1988	1.32/km	1933	△35%	0.7g/km	△65%
				Indirect Injection	260ppm	1988			0%		△46%
			PM		— — — —		0.25g/km		— — —	0.09g/km	△64%
		Heauyweight autos (GVW : 2.5tons-)	NO_x	Direct Injection	400ppm	1989	6.0g/kwh	1994	△17%	4.5g/kwh	△38%
				Indirect Injection	260ppm	1989	5.0g/kwh		△ 2%		△12%
			PM		— — — —		0.7/kwh		— — —	0.25gkwh	△64%
	Passenger Cars		NO_x	EIW≦1.25t	0.7g/km	1986(Autos W/manual transnission) 1987(Autos W/automatic transmission)	(0.5g/km)	(1990)	(△29%)	0.4g/km	△43%
				EIW>1.25t	0.9g/km	1986(Autos W/monua/Trans'nission) 1987(Autos W/automatic Trasimission)	(0.6g/km)	(1992)	(△33%)		△56%
			PM		— — — —		0.2g/km	1994	— — —	0.08g/km	△60%
	All types		Black Smoke		50%	1972	40%		△20%	25%	△50%
Gasoing	Trucks・Buses	Medium-weight autos	NO_x		0.7g/km	1989	— — —	— — —	— — —	0.4g/km	△43%
		Heavy weight autos			650ppm	1989	5.5g/kwh	1992	△19%	4.5g/kwh	△34%

Source: Japan Environment Agency

	SO_2 (ppm)	SPM (mg/m^3)	CO (ppm)	NO_2 (ppm)
Japan	0.04	0.10	10 a/	0.04-0.06 a/
Canada	0.06	0.12	5 b/	0.03 c/
U.S.A.	0.14	0.26	9 b/	0.05 c/
West Germany	0.06	-	9 c/	0.04 c/
France	0.38	0.35	-	-

Notes:

a/Daily average.
b/Average of 8 hours.
c/Annual average.

Table 4.4: Country-by-Country Comparison of Ambient Air Quality Standards

Source: Japan Environment Agency

with PCB being added in 1975. Subsequently,much effort has been made to reach the standards (shown in Table 4.5) for these items, and they have now generally been attained. As detailed in Annex 16, *Revision of Water Quality Standards in Japan*, following the introduction of new drinking water standards, the standards were raised again in March 1993 and new items introduced, as shown in Table 4.6.

For the living environment items, standard values are set according to the type of water use, such as waterworks, fishery, agriculture, or industry in each water area. The relationships between type of water use and the environmental standards for rivers are given in Table 4.7.

Environmental standards relating to the living environment have been introduced gradually since 1970, and, once established, have not been extensively revised. However, growth in the production and use of chemical substances, and the introduction of new chemicals has made pollution of the surface and groundwater by toxic substances a growing problem. In order to respond to this issue and with the 1993 Basel Convention as a momentum, standards relating to certain toxic chemicals, identified in Table 4.6, were added to the environmental standards concerned with the protection of human health, and the standard values for lead and arsenic were strengthened.

In order to achieve specified environmental standards, effluent standards which apply throughout the country, have been established for effluents discharged to public water areas from specified factories and offices. These effluent standards are classified into two groups: standards relating to toxic substances apply to all facilities

ITEM	STANDARD VALUES
Cadmium	0.01 mg/1 or less
Cyanide	Not detectable
Organic phosphorus	Not detectable
Lead	0.1 mg/1 or less
Chromium (hexavalent)	0.05 mg/1 or less
Arsenic	0.05 mg/1 or less
Total mercury	0.0005 mg/1 or less
Alkyl mercury	Not detectable
PCB	Not detectable

Table 4.5: Ambient Water Quality Standards Related to Human Health (Prior to March 1993)

Source: Japan Environment Agency

Table 4.6: New Ambient Water Quality Standards for Human Health (After March 1993)

ITEM	NEW VALUES (mg/l)
Lead	below 0.01
Arsenic	0.01
Dichloromethane	0.02
Tetrachlorocarbon	0.002
1,2-dichloroethylene	0.004
1,1-sichloroethylene	0.02
Cis-1-2-dichloroethylene	0.04
1,1,1-trichloroethane	1
1,1,2-trichloroethane	0.006
Trichloroethylene	0.03
Tetrachloroethylene	0.01
1,3-dichloropropane	0.006
Thiram	0.006
Simazine	0.006
Thiobencarb	0.02
Benzene	0.01
Selenium	0.01

Source: Japan Environment Agency

specified by government ordinance as potentially serious polluters, while standards relating to the living environment only apply to specified facilities which discharge more than 50 m^3/day of effluent.

These general standards, if applied to all factories throughout the country, would in some cases make it difficult to achieve environmental, or ambient objectives. Where population density and factories are highly concentrated, stricter effluent standards are required. For this reason most local governments have established higher standards. For example, as Tables 4.8 and 4.9 indicate, effluent standards in the Osaka Prefecture are generally higher than the general (national) standards for both the health and the living environment items. Sometimes the differences are quite considerable, as the example of Kanagawa Prefecture shows (Table 4.10).

Water Quality Preservation in "Closed Water" Areas

Serious damage caused by the "red tide" has occurred since around 1970 in the Seto Inland Sea. In 1973 the Law Concerning Special Measures for Conservation of the Environment of the Seto Inland Sea was passed. This law aims at the reduction of the effluent load of Seto Inland Sea into one half of that in 1972, and limitations on effluent loads was distributed to each local government on its coast. In conformity with this law, the local governments concerned established stricter regulations and accelerated investment in sewerage and sewage treatment works. The Lakes and Ponds Water Quality Preservation Special Measure Law of 1984 further established the general principle that improvement in the quality of inland closed waters should be addressed by controlling the total amount and quality of effluent discharged into them.

Noise Standards

Following the Noise Control Law of 1970, national ambient standards for noise were established in 1971, and are determined by time of day for each categorized area. As Table 4.11 demonstrates, noise restriction requirements are substantially less in areas that face roads of two lanes or more; moreover, grace periods have typically been available to existing industries before achievement of the standards. In addition to noise emanating from fixed sources, special standards have been applied to motor vehicles, aircraft, and the Shinkansen trains. Details of these standards are contained in Annex 17, *Noise Standards: Motor Vehicles, Aircraft, and Shinkansen.*

Table 4.7: Ambient Water Standards Related to Conservation of the Living Environment for Rivers

Category	Item / Purposes of water use	Standard values				
		pH	Biochemical Oxygen Demand (BOD)	Suspended Solids (SS)	Dissolved Oxygen (DO)	Number of Coliform Groups
AA	Water supply, class 1 : conservation of natural environment, and uses listed in A -E	6.5 -8.5	1 mg/ℓ or less	25 mg/ℓ or less	7.5 mg/ℓ or more	50 MPN/100 m ℓ or less
A	Water supply, class 2 : fishery, class 1 ; bathing and uses listed in B-E	6.5 -8.5	2 mg/ℓ or less	25 mg/ℓ or less	7.5 mg/ℓ or more	1,000 MPN/ 100m ℓ or less
B	Water supply, class 3 ; fishery, class 2; and uses listed in C-E	6.5 -8.5	3 mg/ℓ or less	25 mg/ℓ or less	5 mg/ℓ or more	5,000 MPN/ 100m ℓ or less
C	Fishery, class 3 ; industrial water, class 1 ' and uses listed in D-E	6.5 -8.5	5 mg/ℓ or less	50 mg/ℓ or less	5 mg/ℓ or more	——
D	Industrial water, class 2 ; agricultural water, and uses listed in E	6.0-8.5	8 mg/ℓ or less	100 mg/ℓ or less	2 mg/ℓ or more	——
E	Industrial water, class 3; conservation of the environment	6.0-8.5	10 mg/ℓ or less	Floating matter such as garbage should not be observed	2 mg/ℓ or more	——

Notes:

1. The standard value is based on the daily average value. The same applies to the standard values of lakes and coastal waters.

2. At the intake for agriculture. pH shall be between 6.0 and 7.5 and dissolved oxygen shall not be less than 5 mg/l. The same applies to the standard values of lakes.

3. Conservation of natural environment: Conservation of scenic spots and other natural resources.

4. Water supply, class 1- Water treated by simple cleaning operation, such as filtration. Water supply, class 2- Water treated by normal cleaning operation, such as sedimentation and filtration. Water supply, class 3- Water treated through a highly sophisticated cleaning operation including pretreatment.

5. Fishery class 1- For aquatic life, such as trout and bull trout inhabiting oligosaprobic water and those of fishery class 2 and 3. Fishery, class 2- For aquatic life, such as fish of the salmon family and sweetfish inhabiting oligosaprobic water and those of fishery class 3.Fishery, class 3- For aquatic life, such as carp and crucian carp inhabiting B - mesosaprobic water.

6. Industrial water, class 1 - Water given normal cleaning treatment such as sedimentation. Industrial water, class 2- Water given sophisticated treatment by chemicals. Industrial water, class 3- Water given special cleaning treatment.

7. Conservation of the environment- Up to the limits at which no unpleasantness is experienced by people on a daily basis.

Table 4.8: Effluent Standards for Water Relating to Toxic Substances (Health Items) General Standards and Osaka Standards

Source: Osaka City

Effluent Standards Items	General Standards (Water Quality Pollution Prevention Law)	Stringent Standards (Osaka Prefectural Regulation)
Cadmium	0.1	0.01
Cyanogen	1	Not detected
Organic phosphorous	1	Not detected
Lead	1	0.1
Chromium(hexavalen)	0.5	0.05
Arsenic	0.5	0.05
Total mercury	0.005	0.005
Organic	Not detected	Not detected
PCB	0.003	0.003
Trichloroethylene	0.3	-
	0.1	-

Table 4.9: Effluent Standards Relating to the Living Environment (General Standards and Osaka Standards)

Source: Osaka City

Effluent Standards Items	General	Osaka Standards			
pH	5.8-8.6	5.8-8.6			
		Pulp, paper, and processed paper manufacture (Neyagawa) Daily average volume of effluent of the factory already established (m^3/day)			
		30-50	50-1,000	1,000-5,000	more than 5,000
BOD Highest	160	150	100	65	40
(daily average)	(120)	120	80	50	30
SS Highest	200	200	150	110	80
(daily average)	(150)	150	120	90	60
Oil (mineral oil)	5	5	5	4	3
Animal and plant oils	30	30	30	20	10
Phenols	5	5			
Copper	3	3			
Zinc	5	5			
Iron	10	10			
Manganese	10	10			
Chromium	2	2			
Fluorine	15	15			
Boron	-	2			
Number of Coliform	(3,000)	(3,000)			
Color or Odor	-	No color nor odor which hinders where it is discharged			

Table 4.10: Comparison of Effluent Standards: National Level and Kanagawa Prefecture

Source: Yokohama City

	Effluent Standards (mg/1)	
	National Level	Kanagawa Prefecture
BOD	160	20
COD	160	20
SS	200	50
Phenol	5	0.005
Fluorine	15	0.8

Table 4.11: Ambient Noise Standards

(A) Areas Facing Roads

Area category	Time category: Daytime	Morning-Evening	Nighttime
A areas facing roads with 2 lanes	55 dB(A)	50 dB(A)	45 dB(A)
A areas facing roads with more than 2 lanes	60 dB(A)	55 dB(A)	50 dB(A)
B areas facing roads with not more than 2 lanes	65 dB(A)	60 dB(A)	55 dB(A)
B areas facing roads with more than 2 lanes	65 dB(A)	65 dB(A)	60 dB(A)

(B) Other Areas

Area category	Time category: Daytime	Morning - evening	Nighttime	Applicable areas
AA	45 dB(A)	40 dB(A)	35 dB(A)	Areas designated for each classification of land areas by a prefectural governor based on the provision of Article 2 of the Cabinet Order relating to the elegation of Authority to Designate Water and Land Areas for Environmental Quality Standards (Cabinet Order No.159 of 1971)
A	50 dB(A)	45 dB(A)	40 dB(A)	
DB	60 dB(A)	55 dB(A)	50 dB(A)	

Notes:

A1. "Lane" refers to a longitudinal strip of road with uniform width requisite to allow a single line of cars to travel safely and without hindrance
B1. Areas falling within category AA requires such special quiet as where there is a concentration of convalescence facilities.
B2. Areas coming within category A are used mainly for residential purposes.
B3. Areas coming within category B are used considerably for residential purposes as well as commercial and industrial purposes.

Source: Japan Environment Agency

Standards for vehicle noise have been raised several times since 1971. A reduction of 6-11 phons (92-75% reduction when converted to energy levels) is contained in present standards, which, on a per automobile basis is a strict requirement. In spite of the enforcement of this regulation, however, success in improving ambient standards remains low, because of the rapid increase in traffic; as noted earlier with regard to air pollution, emission standards have been combined with comprehensive traffic control in urban areas, and construction of by-pass routes and loop highways around cities. As an emergency measure, subsidies have also been provided for insulation to reduce noise in individual houses close to national highways;. 44,000 households had been subsidized by 1991.

With regard to aircraft noise, a combination of noise reduction and administrative controls

has been developed. Though standards have been achieved in only a few areas, nuisances have been reduced by a variety of measures. For example, a Certification System for the Adaptation to Aircraft Noise Standards, which prohibits the operation of aircraft emitting noise exceeding the standard levels, was established in 1975, and was reinforced in 1978. Departures and arrivals of jet aircraft are prohibited between 11 pm and 6 am at Narita Tokyo International Airport and Haneda (Tokyo) International Airport, and from 10 pm to 7 am at Osaka International Airport. Noise reduction plans are applied according to the location and situation of other airports. In areas where noise cannot be adequately reduced, other measures such as subsidization for insulation; compensation for relocation; or establishment of green belt buffer zones, are undertaken. Finally, Osaka International Airport and Fukuoka International Airport are designated as airports with development promotion areas, because the areas around the airport have been urbanized. The development authority is established and financed jointly by the national and local governments, implements redevelopment schemes and preparation of relocation sites as part of the airport area development plan, in line with overall local government plans.

Noise standards for the Shinkansen train were established in 1975. Comprehensive measures have been taken, including improvement in the design and reduction in weight of the train car itself, installation of improved noise abatement walls, and improvement of wiring and adjustment of rails. However, some areas still have not yet achieved the ambient standards. On the other hand, installation of insulating material has been completed per individual households in areas where the noise level exceeds 75 phon; the indoor environment is therefore equal to that required for achievement of the standards. Regarding vibration nuisance, installation of insulating material and subsidization of relocation are implemented in areas in which vibration levels exceed the recommended 70 dB (decibel) standard. Noise and vibration countermeasure concerning railroads other than the Shinkansen train have also been implemented. This applies, for example, to the Tsugaru Straits line and the Seto Ohashi line which opened in 1988, and in which public concern led to various kinds of countermeasure.

Pollution Control Agreements

A unique characteristic of Japan's approach to environmental problems is the presence of voluntary agreements between local governments and major industrial enterprises operating, or proposing to operate or expand facilities in their area. The local government negotiates with individual plants to arrive at a detailed written agreement on pollution control measures. In these so-called "Environmental Pollution Control Agreements", quantitative emission levels are determined, based on discussion between local governments and enterprises. Local resident groups may be involved in the agreements. These levels are not regulatory but depend on voluntary compliance by the enterprises. In fact, almost all enterprises comply with the agreed emission

Types of Penalty	1980	1981	1982
Suspension of operation and damage compensation	282	438	447
Applying responsibility for compensation under the no-fault Pollution Act	188	199	205
Other penalties	272	293	476

Table 4.12: Penalties for Violations

Source: Pollution Control Agreements by Industry

levels. In addition, some agreements cover on-the-spot inspections and compensation payments in case of accidents. About 2,500 cases of agreement are concluded annually; the number of valid agreements in effect having increased from about 2,000 in 1971 to 37,000 20 years later.

In fact, it is indispensable for industrial enterprises to obtain approval and cooperation of local governments and the residents if their operations are to run smoothly. The Environmental Pollution Control Agreement is generally recognized as a critical element in this process. The first major agreement was between Yokohama City and the Isogo thermal power plant in 1964. For an example of a specific pollution control agreement, see Annex 18, *Sample Pollution Agreement*.[8] In this agreement Yokohama City, which at that time had no legal authority against pollution, made the enterprise agree to take measures against pollution. The agreement, which provided for a specific pollution control objective, was based upon sound scientific and technical data on air quality, and was extremely effective in practice. Yokohama city subsequently concluded agreements with other enterprises newly locating in the city, as well as with existing large-scale businesses when they invested in new facilities.

Following the Yokohama precedent, agreements on pollution control became widespread throughout the country. At that time it was common to conclude agreements with enterprises which had immediate plans to establish industrial complexes. However, as pollution issues became more tangible and resident movements intensified, cases of

Form of Residents Participation in Pollution Control Agreement				
	1982	1985	1988	1990
Participation as one of the parties concerned	13	43	51	80
Participation as witness	47	40	87	110
Participation as a single party	222	205	214	339

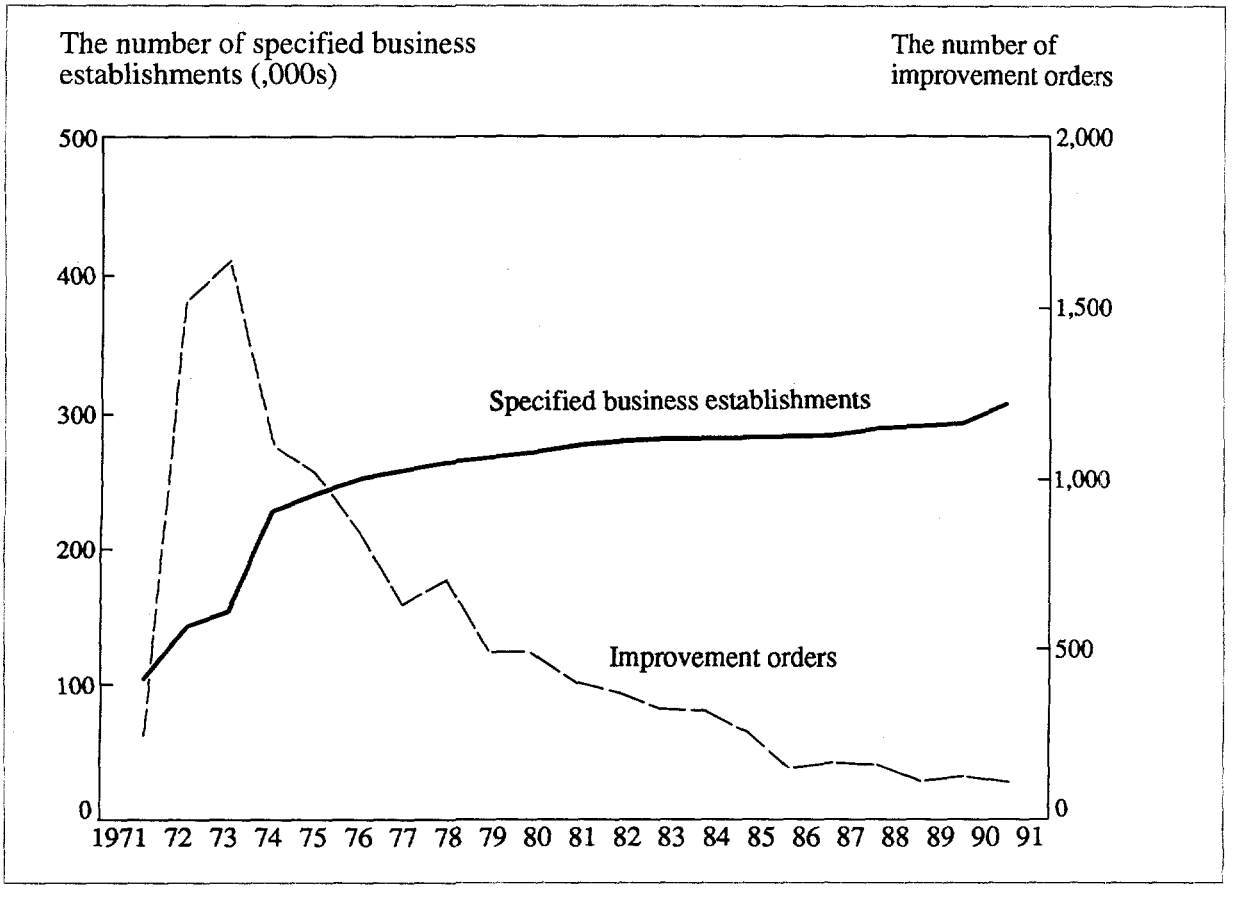
Table 4.13: Resident Participation

Source: Quality of the Environment in Japan

agreement with enterprises whose activities could potentially create pollution at some future date increased. The contents of the agreements also gradually became more detailed. As the agreements are decided on the basis of discussions with each enterprise according to the individual situation, local governments and community organizations tend to take a positive attitude toward the enterprises with the objective of determining a reasonable and effective regulation for each individual enterprise. This has been an important factor in determining the success of this mechanism. The agreements are not limited to secondary industries, the major origin of industrial pollution, but now also apply to tertiary industries, mainly the service sector. Thus, recreation facilities, restaurants and the transport industry have increasingly concluded such agreements.

From the viewpoint of the local government or the population living in the vicinity of potential pollution activity, the system is useful in that the agreed standards are specifically based on local geographical, natural, social, and economic conditions. From the viewpoint of the business establishments, the agreements provide a good opportunity to obtain the official sanction and support of the neighboring population as well as of the local government with regard to its overall business or industrial activities.

Figure 4.3: Number of Specified Business Establishments and Improvement Orders 1971-91



Source: Japan Environment Agency

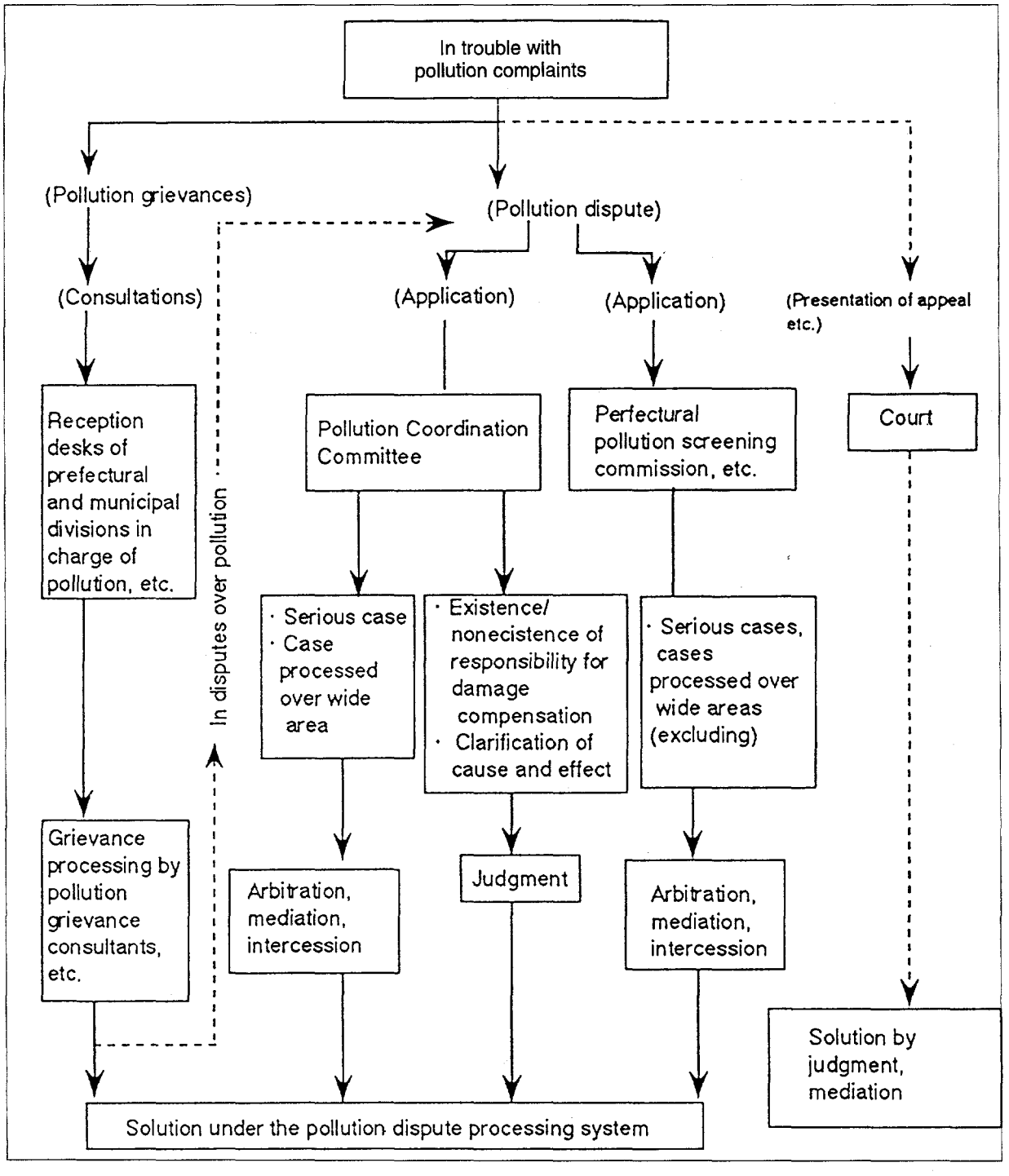


Figure 4.4: The Pollution Dispute Processing System

Source: Japan Environment Agency

Pollution control agreements typically set out actions to be taken in case of agreement violations. Penalties for violation may be very strict as Table 4.12 indicates.

Out of 2,187 pollution control agreements concluded between October 1987 and September 1988, 1,967 were made between local governments and enterprises, while the

remaining 222 were made between residents' groups and enterprises. The form of such participation varies, as shown in Table 4.13.

Monitoring, Inspection, and Penalties

Prefectures and ordinance designated cities have responsibility for carrying out on-site factory inspections and providing guidance to private industry on pollution control matters. Trends in the number of specified sites, the number of on-site inspections performed, and the number of improvement orders are shown in Figure 4.3. This Figure suggests that the combination of on-site inspections (which are performed in about one third of all specified sites per year), combined with guidance by local governments has been effective in reducing the need for improvement, and thus provide the background in which regulations such as the effluent standards can be achieved

Plans to establish, expand or alter specified facilities must be submitted to the prefectural governor or in the case of the ordinance designated city, the mayor who can order changes in the plans on environmental grounds. If standards are not met, the factory will not be allowed to operate. As noted above, local standards are often much higher than those required at the national level. The local government also monitors construction; if construction takes place without local authority permission, the industrial operation may be suspended. Similarly, the governor or mayor also has the authority to order the improvement of the facilities or temporarily suspend the discharge of effluent if it does not meet the effluent standards. If such orders are violated, penal action may ensue. This system is illustrated in Figure 4.4.

It is, however, rare that extreme steps are taken. The threat of other measures, including ultimately being taken to court, is usually sufficient, not only because of the financial or other penalties that might result, but also the adverse publicity arising from such an event. In practice, nearly all issues are resolved early on in the sequence of on-site inspection; guidance; request for information; and recommendations on the part of the local authority. The process has therefore been effective. Through monitoring and on-site inspections, local governments have accumulated knowledge and data on the production processes of various industries, and a better understanding of the causes of pollution and of means of reducing it. The system of monitoring and guidance began to function in a particularly effective manner with the introduction of the notification system for designated facilities which could become sources of pollution, and the establishment of the industrial responsibility system, described below.

The Industrial Responsibility System

To prevent industrial pollution, it is indispensable to establish pollution prevention systems in the factories. One of the contributions of MITI is the introduction of a self-control system for industry through the promulgation of the Law for Establishment of Organization for Pollution Control in Specialized Factories, which was enacted in 1971.

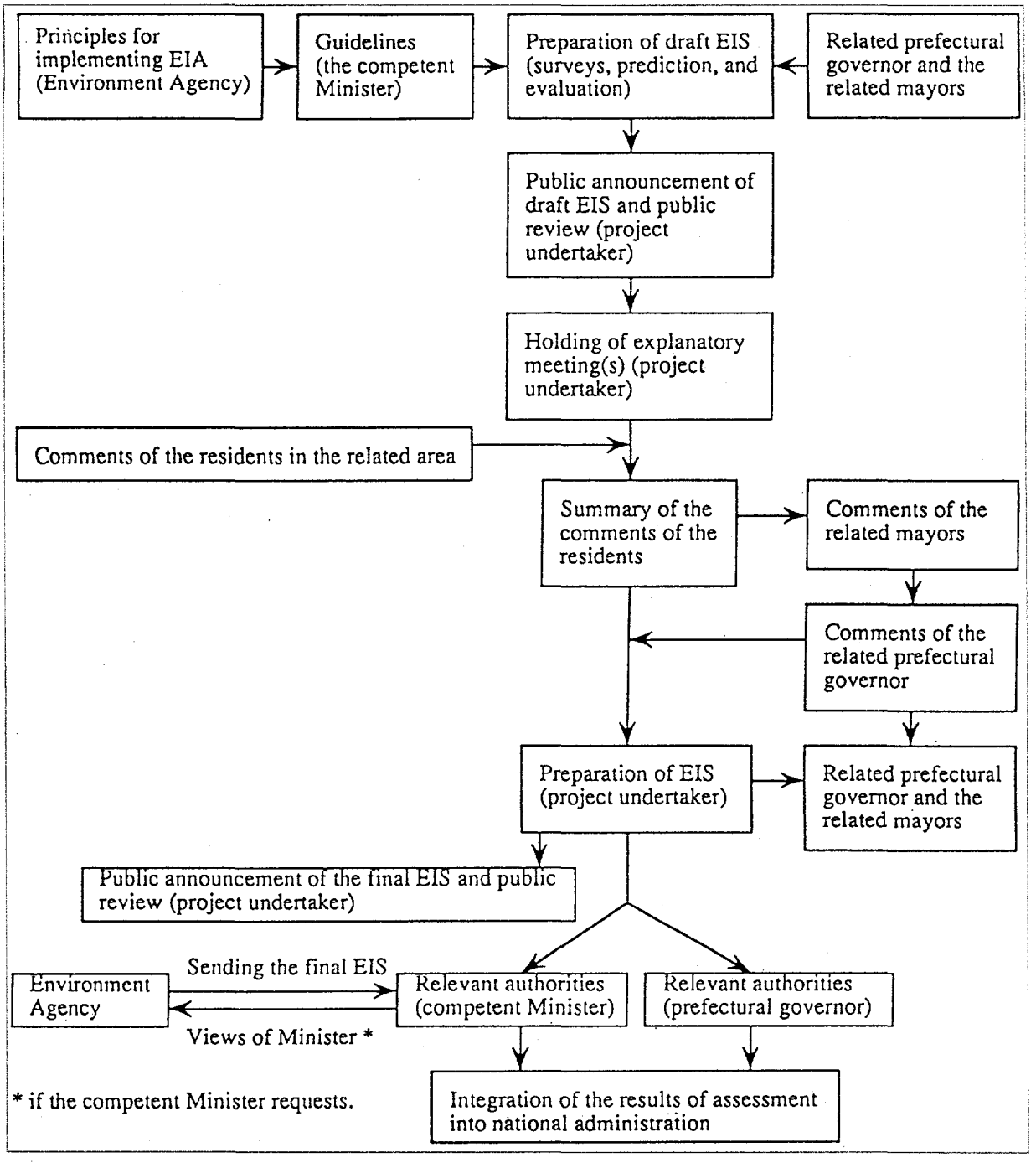


Figure 4.5: Environmental Impact Assessment Procedures

Source: Japan Environment Agency

According to this law, factories over a certain size have to appoint a pollution control supervisor and a pollution control manager who have formal qualifications in pollution control. Pollution control managers are required by law to pass national examinations in order to acquire credentials.

At present, about 23,000 pollution control supervisors and about 40,000 pollution control managers hold these positions. They bear person-

al responsibility for in-plant control. In the case of serious or deliberate environmental non-compliance, they may even be arrested based on the law. Accordingly they have strong motivation to comply with discharge standards set by relevant laws or voluntary agreements. They are also motivated to perform in such a manner that the benefit would be maximized and the cost would be minimized for their factories because they are themselves factory staff. They usually achieve this goal through close cooperation with process engineers. This situation facilitates the development and deployment of cleaner production technologies in industry.

To a large degree, therefore, industry itself has been required to take formal responsibility for ensuring the environmental soundness of its operations. The responsibility system consists of several specific elements. First, there is the obligation to keep records of operational management and pollution load discharges from specified facilities. A number of other duties are specifically required to be carried out by pollution control managers. For example, with regard to air pollution, they are formally responsible for checking of fuel and raw materials; inspection of facilities emitting soot and smoke; operation, inspection and repair of the facilities treating soot and smoke; maintenance of measurement instruments; taking emergency measures in case of accidents involving specified facilities; and reducing emissions of soot and smoke in emergency situations.

The Air Pollution Control Act and the Water Pollution Control Act both require strict record keeping on matters relating to industrial effluents, so that the local authority has a complete understanding of the actual and potential sources of pollution in their area. In particular, changes, or planned changes in plant operations must be reported. This information is checked by frequent on-site inspections.

Environmental Impact Assessment

In June 1972 when the national government approved the document "On Environmental Preservation Measures Related to Public Works", environmental assessment in Japan has been promoted under the Public Water Body Reclamation Law and other specific legislation, administrative directives of ministries and agencies, local ordinances, and plans of various administrations. The decision to implement an environmental impact assessment procedure was taken by the Cabinet in August 1984. In the "Implementation Scheme for Environmental Impact Assessment," a uniform rule applicable to large-scale projects undertaken with the participation of the government was defined. This calls for the adequate survey, prediction, and evaluation of possible environmental impact before the implementation of projects that could significantly affect the environment. The results are announced to the public, and the opinions of the local inhabitants are gathered, so that sufficient precautions can be taken to protect the environment. Thus far, however, environmental impact assessment in Japan has not been enshrined in national statutory legislation.

A large-scale project that could significantly affect the environment must be subjected to the procedures of this Implementation Scheme

if the project is to be operated or licensed by the State. The Implementation Scheme covers the construction of roads, dams, railroads, airports, land reclamation (including filling and drainage), and land readjustment. Figure 4.5 details the procedures to be followed.

The procedure requires that project undertakers must survey, predict, and evaluate the possible environmental impact of the project according to the guidelines which are determined by the competent minister (the minister authorizing the particular project) through consultation with the Director General of the Environment Agency. The results must be included in a preliminary report of the environmental impact assessment before the project is implemented. The project undertakers must make public notices, exhibit the preliminary report, and hold an explanation meeting; they must also endeavor to determine the opinions of local residents. The project undertakers must listen to the opinions of the municipal mayor and must then request the opinion of the prefectural governor concerned. Based on these opinions, the project undertakers must reexamine the preliminary report, prepare the environmental impact assessment report, and publicize it. The concerned department can, if necessary, ask the Director General of the Environment Agency to express an opinion on the assessment report.

In addition to the foregoing procedure, environmental impact assessment is also required under specific legislation. For example, construction and utilization of harbors developed under the Port and Harbor Law must be subject to environmental impact assessment. The Public Water Body Reclamation Law requires an examination of the environmental impact before the reclamation license is issued. The competent minister must ask for the opinion of the Director General of the Environment Agency when he is to issue the license for a reclamation project exceeding 50 hectares or if the reclamation project calls for special consideration on the conservation of the environment. Similarly, environmental assessment for the location of power plants is conducted under the administrative directives of the Ministry of International Trade and Industry. The deliberation at the Electric Power Development Coordination Council should include discussions on the conservation of the environment. In each case, the Environment Agency's authority is restricted to giving an opinion on such projects.

Similar procedures are in place at the local level; however, local governments have their own environmental impact assessment regulations, and are not subject to national level ones. It should also be noted that procedure requires formal representation of citizens' views at key stages in the process, at both the national and local level. Indeed, this is a characteristic of many of the procedures in place in government to achieve environmental objectives. This formalizes the impact of citizens' movements which have been so considerable in the past in bringing about progress in environmental management in Japan, and, subject to certain reservations about actual implementation, referred to below, is highly relevant for other countries.

Although the foregoing procedures represent a major step forward, the environmental impact assessment process in Japan still has a number of shortcomings. Instead of being used

as a tool to evaluate the feasibility of a project by assessing the environmental impacts of various alternatives to the project — and possibly being a cause for rejecting a proposal altogether — environmental assessment is used as a tool to assess the impact of a project with a view to containing such impact within allowable limits, and within a pre-determined project framework. Consequently, while it may be effective in dealing with problems that can be prevented within the scope of a project, it is less effective in preventing damage that a bad project location and design would incur. Moreover, environmental assessments do not address the issue of social disruption incurred by the displacement of residents by a project, other than the standard financial compensation.

Another shortcoming is that environmental assessments of road, port, airport and river projects which are directly managed by the national government are conducted by the national government itself. Local governments in most cases only have the right to express opinions. Similarly, local residents may express their opinions, but the project implementation body actually conducts the environmental impact process, and decides whether or not to take them into account. The ability of local residents to have their views considered depends upon how successful they are in organizing movements able to wield sufficient political power to influence the project.

Environmental assessments are used by local governments in their consideration of development plans, including their own public works projects. In practice, assessment is conducted by a developer, and the assessment report is reviewed by the local government. This examination process may result in requirements that the plans should be changed, or environmental protection measures upgraded. Once more, as the administration has wide ranging discretionary power, the outcome in any particular case tends to be determined by the political power of the developer and that of the local residents affected by the plan. The political influence of the developers has tended to be reduced in recent years due to the liberalization of access to official information, and the growing awareness of environmental issues among the population at large.

Footnotes:

[8] For further details see *Case Studies*.

As described in the previous chapter, national and local governments establish environmental and emission standards and regulations, monitor activities and provide for penalties in cases of non-compliance. However, to complement this regulatory role, governmental agencies also provide a variety of means of support to communities and industry to assist them in achieving environmental objectives. This takes the form of actual environmental investments and other expenditures by government, as well as financial and technical support explicitly designed to achieve environmental goals. In addition, a number of other government policies, e.g., those related to energy, water resources and transportation, have significant, and generally positive, implications for the environment, even though they have not been specifically designed for that purpose.

Government Expenditures on Pollution Control

Local governments are primarily responsible for construction, operation and maintenance of public sector pollution control facilities, including sewerage and sewage treatment works, solid waste and night soil management facilities, establishment of parks and green zones, and noise prevention. However, the national government assists them with subsidies which generally cover a part of the construction costs. Expenditures at the local level now constitute roughly three quarters of total public expenditures on pollution control, the remainder being carried out by ministries and agencies of the national government, for the various purposes reviewed in Chapter 3. Table 5.1 shows expenditures on pollution control equipment (i.e., excluding civil works and site develop-

	Private (1)	Local Government (2)	Exports (3)	Total (Domestic Production) (1+2+3) (4)
Investments (billion yen)	262 (27.48%)	640 (66.9%)	55 (5.7%)	957 (100.0%)
A. For prevention of air pollution	61.1%	2.9%	77.9%	23.2%
B. For prevention of water pollution	29.6%	51.4%	11.2%	43.1%
C. For solid waste treatment	6.6%	45.%	10.8%	32.5%
D. For prevention of noise pollution	2.7%	0.7%	0.1%	1.2%
Total	100%	100%	100%	100%

Table 5.1: Expenditures on Pollution Control by Type of Equipment (1991)

Source: Japan Industrial Machinery Association (1992)

Table 5.2: Public Investment in Pollution Control 1967-91

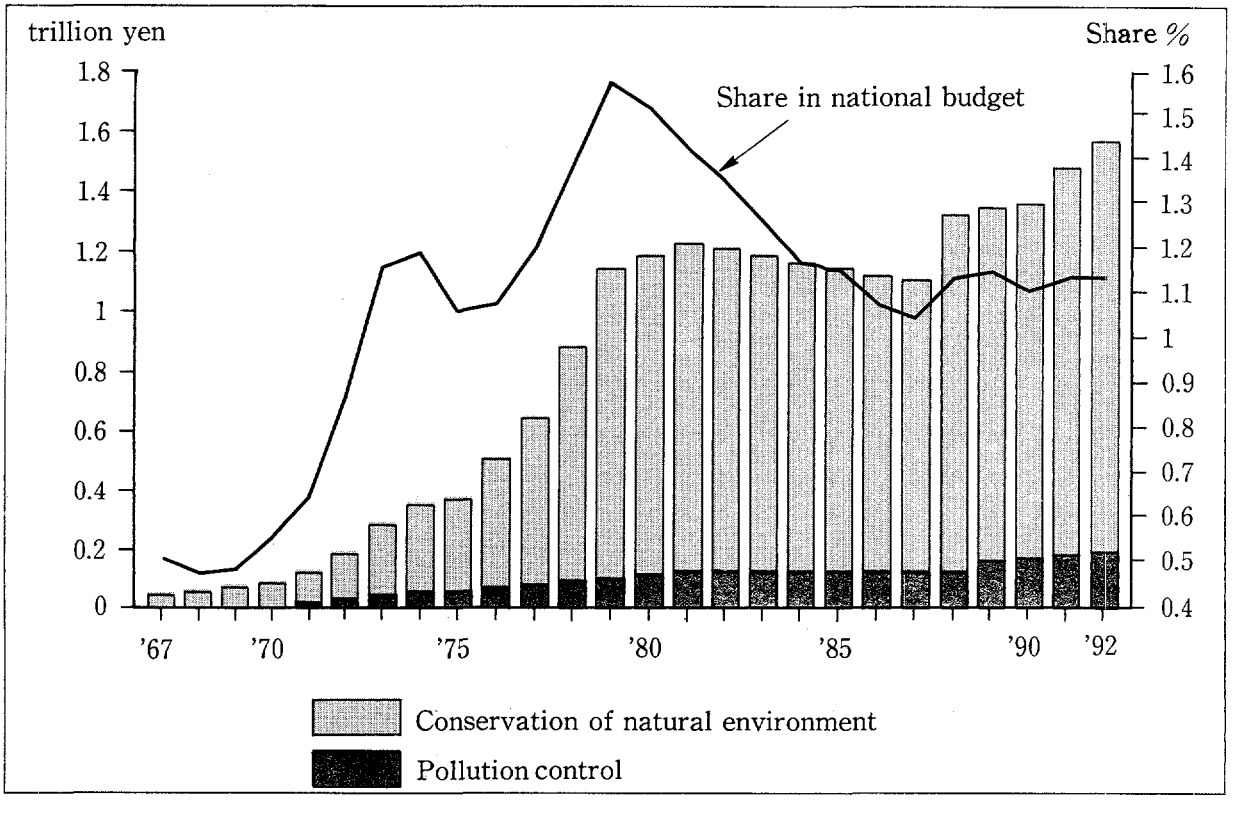
Source: 1990 Sewage Year Book issued by Water Supply Industry Newspaper

(billion yen)

	Sewerage and Sewage Treatment (a)	Solid Waste Management Facilities (b)	Night Soil Management Facilities (c)	Total (a+b+c) (d)	Ratio of (d) to GNP (e)	Ratio of (d) to Public Works Investment (f)
Annual Average during 1967-1971	186	20	12	218	0.56%	2.4%
Annual Average during 1972-1975	520	116	33	669	0.55%	3.7%
Annual Average during 1976-1980	1,500	163	50	1,713	0.84%	8.6%
Annual Average during 1981-1985	2,360	222	56	2,638	0.92%	7.7%
Annual Average during 1986-1991	2,440	281	64	2,785	0.74%	n.a.

ment) by industry, government (i.e., primarily local government), and exports by private industry. The table shows that public investment is dominated by two items: namely, equipment for prevention of water pollution (51%), and municipal solid waste treatment equipment (mostly incinerators) (45%). It also shows that while investment in water pollution prevention and solid waste management falls primarily in the public domain, that for air quality improvement is primarily a private sector responsibility.

Figure 5.1: National Government Expenditures Related to Environmental Management (1967-92)



Source: Japan Environment Agency

Table 5.3: Public Expenditure on Pollution Control, Cost Recovery, and Subsidies (1991)(estimated)

				(billion yen)
	Sewerage & Sewerage Treatment (c)	**Municipal Solid Waste Management** (b)	**Night Soil Management** (c)	**Total** (a+b+c) (d)
1. Capital Costs	92	9405	92	3,812 (65%)
2. Operation & Maintenance	283	881	283	2,023 (35%)
3. Total (1+2)	375	1,286	375	5,835 (100%)
4. Cost Recovered	54	52	54	1,2944 (22%)
5. Cost Recovery Ratio	14%	4%	14%	22%
6. Subsidy by Central Government	12%	53	12	748

Notes:

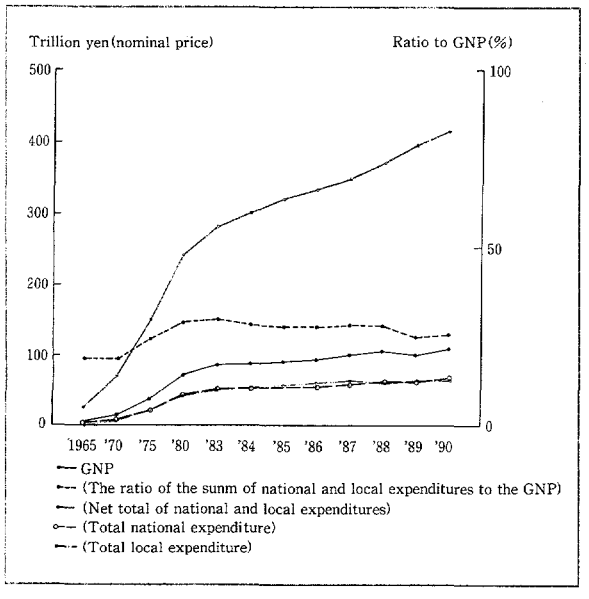
1. Capital Costs are comprised of depreciation (62%) and interest payments (38%).
2. Interest payments are estimated assuming that (a) construction costs that are not covered by subsidies are finance by loans; (b) loan interest rate is 5% and repayment period 20 years.

Source: Ministry of Health and Welfare

Total public investment in environmental conservation has generally increased since World War II both in absolute amounts as well as in proportion to GNP and total investment in public works. During the period from 1986 to 1991, annual average government pollution control investment amounted to 2,785 billion yen, or 0.74% of GNP. Figures for investments in all public works for this period are not available, but in the previous five-year period, government investment in pollution control was 7.7% of total public works investment, as shown in Table 5.2.

By comparison, in fiscal year 1993 the national government budget for public works amounted to 8,560 billion yen, or 12% of its general budget. 29% of the public works budget was used for road construction, 17% for the management of mountains and rivers, and 17% (1,455 billion yen) is invested in environmental sanitation, including water supply and sewerage systems. Figure 5.1 shows trends in national expenditures related to environmental management between 1961 and 1992; this indicates that expenditures peaked around 1990, and now constitute about 1.1% of the national government budget.

Figure 5.2: National and Local Government Expenditure and GNP (1965-90)



Source: Economic Planning Agency

In 1991, investment (including interest payment) in environmental conservation facilities by local governments approximated 4,000 billion yen, total expenditures, including operation and maintenance being of the order of 6,000 billion yen. As shown in Table 5.3, cost recovery from beneficiaries was about 22% on average. Subsidies from the national government amounted to about 20% of total capital costs, or about 13% of total costs.

It is estimated that total government expenditure on pollution control for construction, operation, and maintenance of sewerage, solid waste and night soil management facilities, in addition to parks, green zones, and noise prevention is currently about 2% of GNP. Implementation of pollution control measures is essentially a local responsibility, and therefore local government expenditure for this purpose is a much larger proportion of total expenditure than it is at the national level. As Figure 5.2 shows, total expenditure at the national level and local levels are, and historically have been, about the same. However, as noted earlier, local expenditure on pollution control is about three times that at the national level. (The figure also indicates a generally declining trend of government expenditure as a proportion of GNP over the last 20 years).

Construction costs for environmental conservation facilities are partly subsidized by the national government. Ratios of subsidies vary depending on kinds of facilities, and whether or not construction sites are located in specially designated areas. Subsidies form two thirds of construction costs for inter-municipal sewerage construction; one half for public sewerage; and one quarter for incineration and final solid waste disposal facilities. The subsidies are applicable to only those facilities that meet the government standards and guidelines. This is why the actual ratios of the paid subsidies to actual construction costs are lower than those shown above.

Local Public Finance Local governments obtain a variety of subsidies from the national government for pollution control. Allocated according to the financial capacity of the local authority concerned, direct grants and low-interest loans are available to help meet construction costs of sewerage, sewage treatment and disposal, and solid waste facilities. Even the larger cities receive some subsidies from the national government; for example, Table 5.4 shows that 12.4% of Yokohama City's revenue in 1990 was obtained from the national government. As shown in Table 5.5, expenditures on pollution control, solid waste, and sewerage, which in 1960 amounted to about 5 % of the city's total expenditure, were 22 % in 1980 and 18 % in 1990.

Year	Total Revenue (in million yen)	Own Resources (%)	Prefectural Subsidies (%)	National Subsidies (%)
1960	17,358	83.3	2.7	13.9
1965	47,498	812.9	3.6	14.5
1970	107,701	72.8	5.5	2`.7
1975	287,712	72.5	4.4	23.1
1980	557,800	73.8	4.3	21.9
1985	756,091	80.9	3.8	15.2
1990	1,093,208	82.3	5.3	15.4

Table 5.4: Sources of Revenue: City of Yokohama 1960-90

Source: Case Studies

Technical and Financial Support: The Japan Environment Corporation

In 1963, the Government began to provide loans on favorable terms through the Japan Development Bank and Small Business Finance Corporation to facilitate investment in pollution control in industrial operations. However, as demands grew, a special organization became necessary to evaluate investments and provide financial and technical support for pollution control measures and so in 1965, the Environment Pollution Control Service Corporation (EPCSC), financed entirely by the government, was established. At that time, most of the aid consisted of subsidies for a wide range of purposes such as the prevention of underground water contamination, and joint facilities to dispose of industrial wastes. In 1992, the EPCSC was renamed the Japan Environment Corporation (JEC).

Using an investment fund and government subsidies, JEC has become a major instrument of government policy to promote pollution control measures in industry. Its work now consists essentially of site construction and transfer, financing and technical advice. Site construction and transfer includes building of facilities for collective use or for public welfare, and provision of industrial sites to which factories can be transferred. Factories transferred are primarily small and medium sized industries, which have, over the years, gradually expanded in sites adjacent to residential areas with air and water pollution, ground subsidence, solid waste, noise, vibration and smells

Share of Total City Expenditure (%)	1960	1965	1970	1975	1980	1985	1990
Pollution Control (A)	0.00	0.02	0.10	0.32	0.20	0.19	0.18
Solid Waste (B)	1.87	2.28	2.02	4.46	3.39	2.38	2.33
Sewerage (C)	3.18	5.15	7.56	11.17	18.77	18.95	15.72
Environmental Expenditure {(A)+(B)+(C)}/(D)	5.05	7.45	9.68	15.95	22.36	21.52	18.23
Total City Expenditure (D) (in million yen)	29,202	98,768	228,874	518,553	954,436	1,351,895	1,913,795

Table 5.5: Environmental and Total Expenditures: City of Yokohama 1960-90

posing threats to human health and general welfare in their neighborhoods.

This intermingling of industry, commerce and housing became increasingly serious during the 1960s, and it became clear that separate industrial estates, at some distance from residential areas, were required. Economies of scale in site acquisition and infrastructure development, including municipal waste disposal measures, have made assistance from the public sector indispensable, and the JEC now performs this role. In practice, joint facilities include provision of open space to reduce the impact of air pollution, development of natural parks and green belts, and investment in collective facilities to dispose of industrial wastes. Where joint disposal methods cannot be used, the JEC assists in measures within factories to switch to less polluting processes, building pollution control facilities within plants, or improving buildings to make them more sound-proof. The JEC in most cases undertakes any site acquisition that might be required, and carries out all construction work required for environmental purposes. Where appropriate, it then transfers the completed facilities to the concerned enterprises. It also provides them with long-term (up to 20 years) loans at lower interest rates than the market.

By the end of 1988, over 3,500 enterprises had moved to new sites under JEC projects; total JEC expenditures up to that time were about 380 billion yen. A further 192 billion yen was spent on green park buffer zones; the total area handled under this project is about 1,000 hectares, which is 90% of all the green buffer zones in Japan. Total loans up to the end of 1989 were 740 billion yen, the total number of contracts being 3,738. Loan amounts have declined in recent years, while construction and transfer activities have increased. Total low interest loans made by the JEC and loan balances during the last four years are shown in Table 5.6.

The Japan Environment Corporation is not the only source of subsidized loans for industrial pollution control; indeed, it is by no means the largest source, and it now finances a very small proportion of total investment in industrial pollution control. It has, however, played an important financing role in the past, particularly in the 1960s and 1970s when other private banks were reluctant to lend for investments

Table 5.6: Budget of JEC

(100 million yen)

	1989	1990	1991	1992	1993
Projects					
Construction & transfer	490	490	50	540	630
Loans	200	250	300	350	370
Total	690	740	800	890	1000
Borrowing from Financial Investment and Loans					
Debts	485	538	683	783	865

Source: Japan Environment Corporation

that were not perceived to be directly productive. However, its most important role now is in terms of its technical contribution to the solution of environmental problems. Thus, in addition to site acquisition, construction and financing, JEC also implements technically advanced projects, and provides technical guidance and leadership to industry, especially to small- and medium-sized enterprises.

Other Financial Support Mechanisms

Loans In addition to sole financing by the JEC, several other loan systems have been developed at the national level. Often depending upon the technical evaluation of the planned facility by the JEC, and frequently jointly financed with the JEC, these include:

■ Loans under the Funding System for Modernization of Facilities of Medium and Small Businesses: Prefectures serve as field offices in advancing loans. As part of the system, loans are available for pollution prevention facilities specified by government. Systems also exist to permit leasing of facilities by lending institutions established by prefectures. In many instances local government loans are administrated by commercial banks.The amount of lending in 1992 was 44.5 billion yen.

■ Loans by the Small Business Finance Corporation and People's Finance Corporation: These institutions advance special loans for industrial pollution prevention and other facilities and also special loans to assist medium and small businesses' factories to relocate from existing premises in order to mitigate excessive congestion and prevent pollution.

■ Loans by the Japan Development Bank: the Japan Development Bank has advanced loans for general industrial-trial development since 1960. Total lending in 1992 was 2,533 billion yen of which 3% was specifically for pollution control (76 billion yen).

■ Others: In addition, loans for pollution control have been advanced by the Hokkaido and Tohoku Development Corporation, the Agriculture, Forestry and Fishery Finance Corporation and the Metal Mining Agency of Japan. The amount of lending for environmental protection in 1992 was 1.1 billion yen for Agriculture, Forestry and Fishery Finance Corporation and 2.4 billion yen for Metal Mining Agency.

Favorable Tax Treatment Special depreciation measures have been formulated for specified facilities for pollution control at the national level. These measures are applied to facilities which are directly effective in pollution prevention, as designated by the Minister of Finance. In the first year, in addition to ordinary depreciation (about 10%), a further 21% can be written off as special depreciation for pollution control.

At the local level, property taxes for facilities related to pollution control may be exempt or subject to reduced rates depending on the facility concerned. The range of facilities which may qualify for local tax breaks is wider than that for the special depreciation measures. Moreover, even if the company concerned makes financial losses, special measures are available. Firms may obtain exemption from

Table 5.7: Sources of Finance for Environmental Protection Investments in 1991 (Estimated)[9]

Unit: billion yen

Application	Total Investment (equal to the sum of Items 1 to 10)	Sources of Investments									
		Industry's Own Finance	Private Banks & Other Commercial Institutions	Prefectural & Local Governments			Japan Environment Corporation (JEC) Loan	Other Governmental Lending Institutions Loan	Central Government		
				For Private Industry		Self-financing of Own Program			For Local Government		Own Program Expenditures
				Loan	Grant Subsidy				Loan	Grant Subsidy	
	0	1	2	3	4	5	6	7	8	9	10
A. Pollution Control Investments by Private Industry	493 (100 %) [12.8 %]	349 (71 %)		19* (4 %)	6* (1 %)		30 (6 %)	89 (18 %)			
B. Government Investments in Environmental Facilities											
1. Sewage piping & sewage treatment	2,328 (100 %) [60.5 %]		698 (30 %)			234 (10 %)			698 (30 %)	698 (30 %)	
2. Solid waste management	273 (100 %) [7.1 %]		82 (30 %)			55 (20 %)			82 (30 %)	54 (20 %)	
3. Human waste management	62 (100 %) [1.6 %]		19 (30 %)			12 (20 %)			19 (30 %)	12 (20 %)	
4. Green & nature conservation in urban areas	625* (100 %) [16.2 %]					289* (46 %)				336* (54 %)	
5. Pollution monitoring & Study	69* (100 %) [1.8 %]					29* (42 %)					40* (58 %)
Sub total of B (1+2+3+4+5)	3,357 (100 %) [87.2%]		799 (24 %)			619 (18 %)			799 (24 %)	1,100 (33 %)	40 (1 %)
C. TOTAL (A + B)	3,850 (100 %) [100 %]	1,148 (29.8 %)		19 (0.5 %)	6 (0.2 %)	619 (16.1 %)	30 (0.8 %)	89 (2.3 %)	799 (20.7 %)	1,100 (28.6 %)	40 (1.0 %)

Data Sources:

Environment White Paper 1993, Environment Agency of Japan (All data marked with "*")
Brochure of JEC (Item A of Column 6)
Sewage Statistic Book 1991, Japan Water Supply and Sewerage Association (Items B1, B2 and B3 of column 0)
Ministry of Industry (Item A of Column 0)
Respective lending institutions and author's own estimation based upon the past trend (Item A of Column 7)

special land holding taxes and reduction of urban planning taxes and business taxes in case of extension and establishment of new facilities. Normal rates for the fixed property tax and urban planning tax are 1.4% and 0.3%, respectively. Since the rate of property assessment is 2/3 of actual value, tax exemption reduces the tax burden by 1% of the value of the facility concerned.

Other Subsidies Subsidies for research and development in the field of pollution control has been provide by the MITI. Loans at favorable rates to small- and medium-sized

Types of Subsidies	Estimated Present Values of Net Benefits to Firms
1. Direct subsidies by prefectural or local governments	6 billion yen (1.2 %)
2. Indirect subsidies in the form of tax breaks and low-interest loans	
a. Exemption of local governments' property tax & urban planning tax on the pollution control facilities	28.3 billion yen (5.7 %)
b. Reductions in corporate income tax through application of accelerated depreciation method for investments in pollution control facilities	13.6 billion yen (2.7 %)
c. Subsidy portion of low-interest loans (difference between commercial and government lending rates)	8.7 billion yen (1.8 %)
Sub-total of Item 2	50.6 billion yen (10.2 %)
Total Subsidies (1 + 2)	56.6 billion yen (11.4 %)
Pollution Control Investments by Private Firms	493.0 billion yen (100 %)

Table 5.8: Scale of Subsidies for Pollution Control Investments Relative to the Investment Amount in 1991 (Estimated)

Technical Note on Methods, Assumptions and Data Sources Used for Estimation of the Present Values of the Subsidies:

(The following item numbers correspond to Item No. of Table 5.8)
1. Direct subsidies by prefectural or local governments.
Data source: Environmental White Paper 1993, Environment Agency of Japan
2.a. Present value of the exemption of local governments' property tax and urban planning tax on the pollution control facilities.
Methods and Assumptions for the Estimation:
A x B x C x (D + E) = 5,000 billion yen x 1/2 x 2/3 x (1.4% + 0.3%) = 28.3 billion yen where,
A: Estimated total purchase value of all the pollution control facilities installed and operated by private firms as of 1991 [assumed to be 5,000 billion yen with the following calculation: Annual investment in pollution control facility (500 billion yen/year) x 10 years = 5,000 billion yen]
B: Ratio of the 1991 accounting book value of all the pollution control facilities installed and operated in Japan to the above Item A (assumed to be 0.5)
C: Ratio of taxable property value to accounting property value used by local governments (2/3)
D: Rate of the Property Tax imposed by local governments (1.4%)
E: Rate of the Urban Planning Tax imposed by local governments (0.3%)
(Note: This tax break is applicable to all firms with pollution control investments irrespective of whether or not the firms generated profits.)
2.b. Present value of the reductions in Corporate Income Tax through the application of accelerated depreciation method for investments in pollution control facilities.
The following assumptions are used:
1. Normal depreciation period is 10 years, and annual depreciation is 10% of the facility purchase value.
2. Firms with pollution control investments can apply an accelerated depreciation method, which allow the firms to depreciate 31 % of the pollution control facility purchase value in the first year, and 10 %/year for the next 6 years, and 9 % in the last 8th year.
3. Corporate Income Tax is 40% of firm's profit.
4. 80% of the firms with pollution control investments make profits.
5. Tax reductions arising in future are discounted at 7%/year to translate the future reductions into the present value.
7. Total investment in the pollution control Table was 493 billion yen in 1991.
2.c. Present value of the subsidy portion of low-interest loans (benefits arising from the difference between commercial and government lending rates).
The following assumptions are used:
1. Interest rate of the government lending institutions is 5 %, two percent lower than a commercial lending rate of 7 %.
2. Loan period is 10 years for both government and commercial banks.
3. Private firms borrowed a total of 119 billion yen in 1991 (Based on Table 5.7)

Source: Case Studies

industries for commercialization of new domestically-produced technology are also available. Another form of subsidization is the conduct of joint research and development between MITI and the private sector. Manufacturers of pollution control equipment also receive government support; the Japan Industrial Machine Manufacturers' Association receives subsidies from the Machine Industry Promotion Fund, particularly with regard to the advance surveys required prior to embarking upon major investment programs in pollution control equipment.

Finance of Environmental Protection by Sources

This section attempts to provide an overall picture on the finance of the environmental protection activities of both private and government sectors in Japan. Table 5.7 shows the amounts of finance by sources estimated based on several different data sources and assumptions. The data presented in the table is of one year period in 1991. However, the table is still useful in understanding relative ratios of financial contributions among several different financial institutions as these ratios have not changed much in the past.

Finance of Government Investments in Environmental Protection Facilities Most of the government investment programs for management of sewage, solid waste and human waste, as well as for the nature conservation are implemented and managed by local governments. As shown in Table 5.7, the central government provides local governments with subsidies, which typically cover 20% - 30% of the approved part of the programs. The central government also provides the local governments with loans, which also typically cover 20% - 30% of the approved part of the program. A part of those programs are financed by commercial bank loans, which typically cover one third of the investments. The remaining portions, which usually ranges from 10% to 20% are financed by local governments' own funds.

Finance of Private Firms' Pollution Control Although, the Japan Environment Corporation (JEC) and other lending institutions such as Japan Development Bank and Small Business Finance Corporation, and People's Finance Corporation as well as local governments play an important role in the provision of financial incentives for pollution control, their overall financial contribution is not as large as generally thought. Of the total amount (493 billion yen) invested by private firms in the pollution control facilities in 1991, 71% was financed by either firms themselves or by commercial bank loans, 24% was financed by governmental lending institutions, and the remaining 5% by prefectural or local governments.

Magnitude of Subsidies Relative to Pollution Control Investments Types of subsidies and their respective magnitude relative to the pollution control investment amounts are summarized in the following table. The present values of the subsidies are estimated to be 56.3 billion yen in total in 1991, corresponding to 11.4% of the total pollution control investments made by private firms in the same year.

Regional and Urban Planning

Regional Environmental Pollution Control Program The national government designates areas where pollution is sufficiently serious as to require special attention and integrated actions. These areas qualify for assistance under the Regional Environmental Pollution Control Program (REPCP), and are primarily selected following application by local governments in the areas concerned. Once an application is approved, the local governments concerned prepare a regional environmental pollution control program. This program is revised every five years and only ends when pollution has reached acceptable levels. Works implemented according to the programs receive more favorable national aid than works in non-designated areas.

The Basic Law for Environmental Pollution Control states that the regional pollution control program is to be formulated by the local government of nationally designated areas in accordance with the basic policy made by the central government. However, it also stipulates that the central government has to consult with the relevant local government prior to the formulation of basic policy. Therefore, the central government cannot individually determine the basic policy without the deliberation and coordination with the local government.

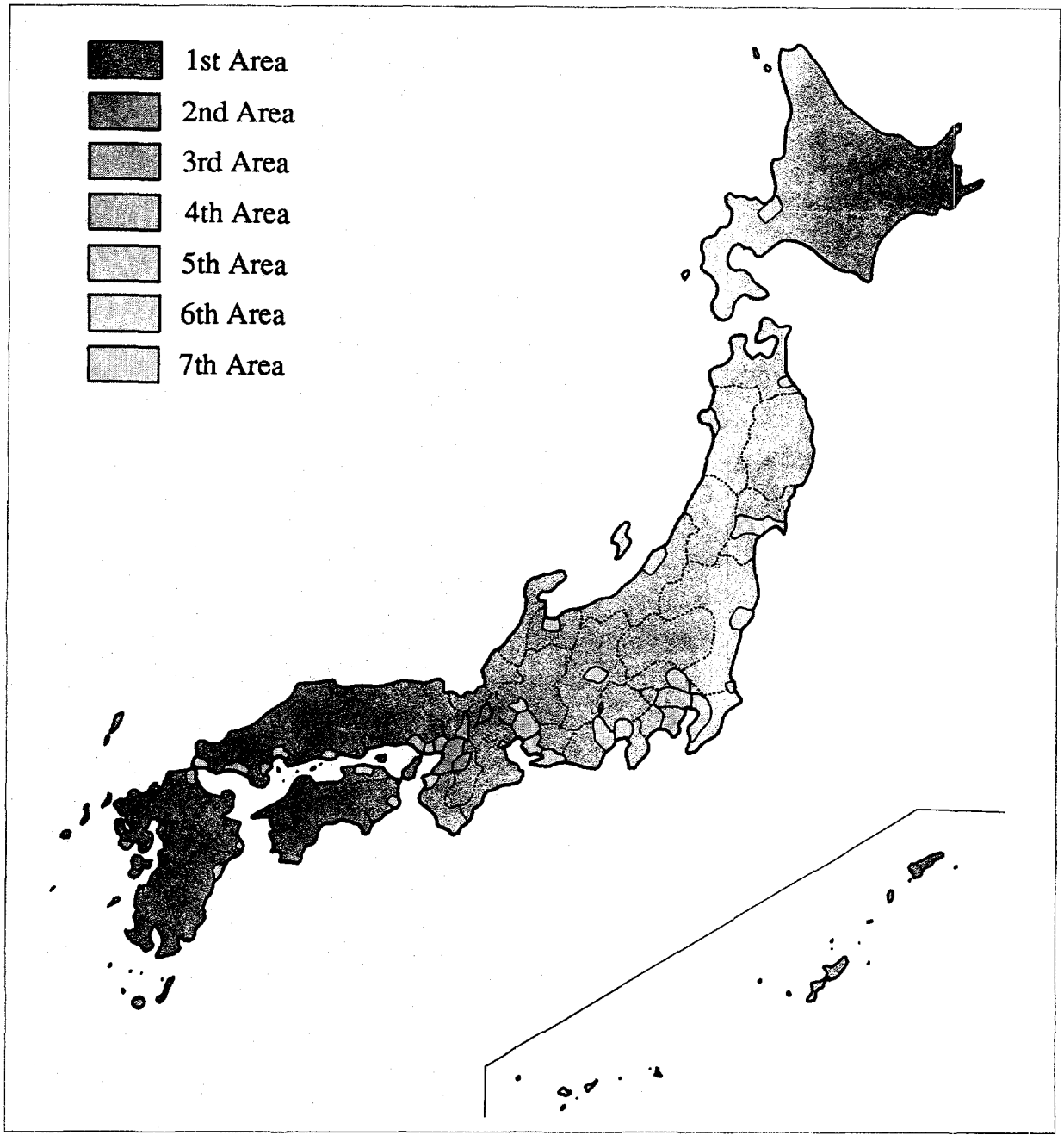
The REPCP generally consists of pollution abatement measures and actions taken by the local government as well as by the private sector. Financial assistance may be available to promote the implementation of these programs under the Law concerning Special Governmental Financial Measures for Pollution Control Projects. Under this law, some of the pollution abatement projects such as sewerage and sewage works, development of solid waste treatment facilities, and household effluent treatment works have been carried out with the financial assistance of the central government.

Similar types of efforts were also made to counter air and water pollution. Based on the Water Pollution Control Law, the central government has designated certain closed areas of water as heavily polluted areas and area-wide total water pollution load control plans were formulated for each area by the relevant local governments. Concerning air pollution, the area-wide control plans for soot and smoke were also established based on the Air Pollution Control Law. Automobile pollution control programs such as that developed by the Yokohama City Government[10], and regional environmental management plans, now formulated by various local governments, are results of the REPCP.

REPCPs were formulated in most of the major urban and industrial areas in Japan between 1970 and 1976. From 1977 onwards, they have been revised taking into account the change of economic and social conditions in each region. Currently 39 regions are designated as REPCP areas (see Figure 5.3). These regions represent about 9% of Japan's total land, and 54% of its total population.

Development Policies for National Land and Districts Japan's agricultural tradition and the strong political power of the agricultural, forest and fisheries industries had for many

Figure 5.3: Designated Areas for the Regional Environmental Pollution Control Program



Source: Japan Environment Agency

years been instrumental in protecting the rural environment, despite the fact that most explicit environmental measures were aimed at industrial and urban pollution. However, this situation became increasingly threatened during the period of rapid economic growth, when national and local land use plans tended to ignore environmental considerations, and rapid development started to impact adversely upon the natural environment. For example, national land planning led to the concentration of population and industries

along the Pacific coast. Growth in this area in the 1950s and 1960s was a major cause of the destruction of the natural environment and massive industrial pollution.

In light of this kind of threat, environmental considerations started to become increasingly significant elements of national land planning in the 1970s. Thus, the National Land Development Plan and the Capital Region Development Improvement Program (which include the distribution of population, utilization of land, water and energy development, improvement in infrastructure, housing and urban areas) are now systematically coordinated with the relevant economic plans. Sectoral programs and policies relating to industry, transportation, energy, water resources and urbanization are built into overall economic planning, and this provides the opportunity for environmental issues to be addressed in a coherent way. Among other things, this process assists in regulating urban and industrial pollution, and has established an orderly and consistent utilization of land on a national basis.

City Planning and Construction Standards City planning and policies relating to construction standards have contributed to improvements in urban and industrial pollution in a number of ways. For example, local public bodies can designate areas for specific uses. Zoning for land use and density of land utilization permits them to segregate industrial, commercial and residential land uses, and assists in achieving low cost means of waste disposal by creation of joint facilities for industrial parks. City planning also establishes limits on urban sprawl, and has helped to preserve nature and the various environmental functions of water resources in suburbs; it has also facilitated the supply of water and provision of sewerage facilities in all urban areas.

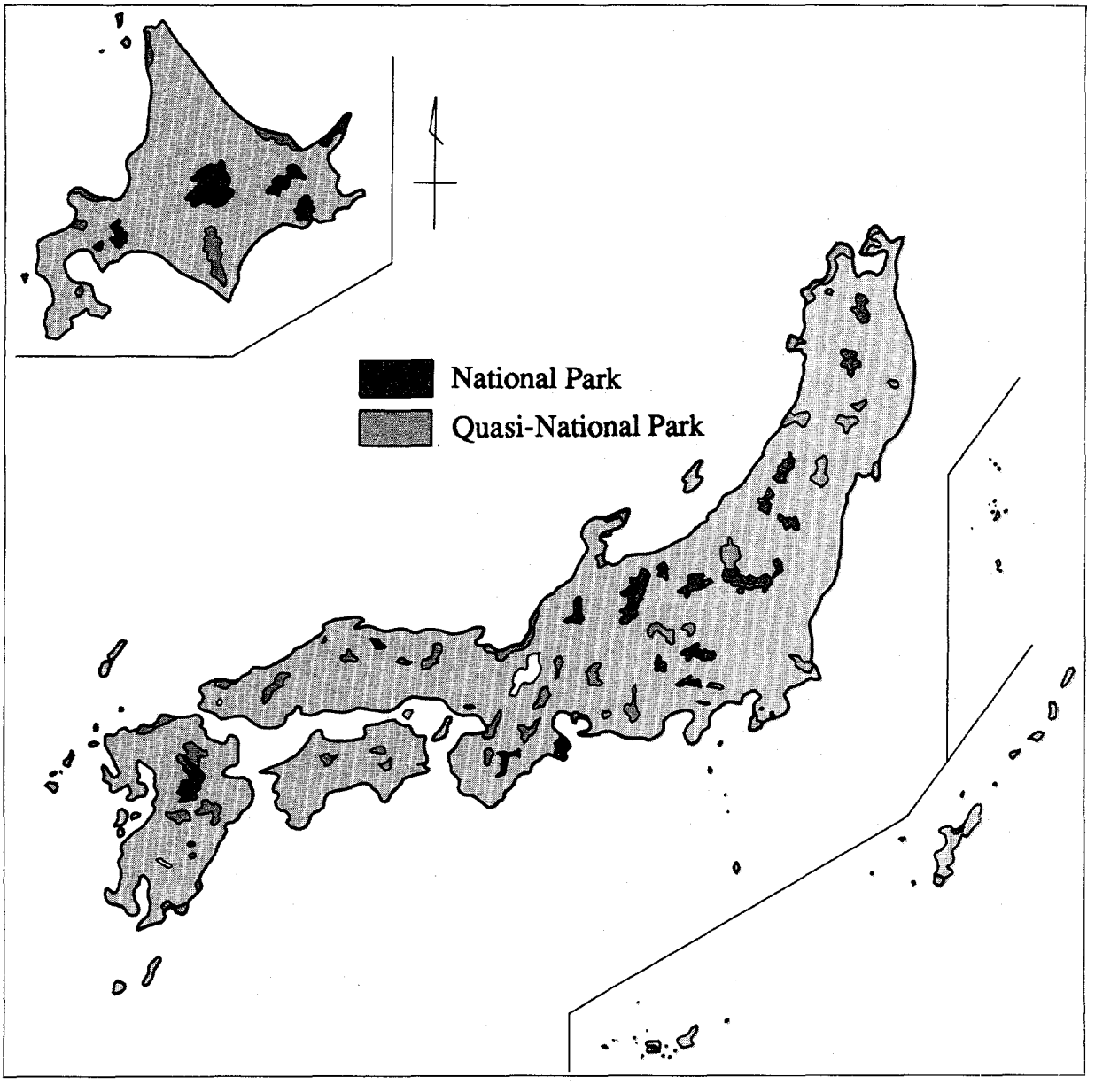
According to the Building Standards Law, local governments may reduce negative environmental impacts in the process of granting approval for construction of buildings. In particular, large buildings are often required to contain facilitates to store waste, to circulate waste water and to release effluent at night, in order to reduce pressure on waste collection and disposal capacity of sewerage. Conditions are also imposed on the height of buildings (in order to allow others to retain views or sunlight); free planting requirements are also common.

National and Local Parks Many specially designated areas have been established at the national and local levels. The location of the country's national and quasi-national parks is shown in Figure 5.4. These parks exist for the protection of nature, wildlife and historic landscape, historical legacies, and conservation of rows of houses and stores. Measures to control development in designated areas, and assistance for preservation is also available. Implementation of development projects requires survey of ruins or historical sites in the area, and government approval to interfere with them is required.

Education, Training, Standardization of Technology

Organization of pollution administration in Japan is based upon relevant experience that has been

Figure 5.4: Location of National and Quasi-National Parks



Source: Japan Environment Agency

built up over many years, particularly in the major cities. The accumulation of existing technical expertise in sanitation/health and industrial processes has provided a solid foundation for more comprehensive environmental efforts. In the field of monitoring and guidance, utilization of existing skills and human resources owned by construction management authorities and police departments were also instrumental in hastening the development of environmental pollution control.

Training mechanisms in the area of pollution control were formally organized around 1970. Since then, research, technological development, and training, as well as the necessary organizational restructuring have all proceeded rapidly in both the public and private sectors. Enterprises

now routinely employ managers whose duties are related solely to pollution control. Pollution Control Associations (whose members consist mainly of industrial enterprises) have been established throughout the country to promote discussion and collaboration with local governments on pollution control. Numbers and qualifications of environmental staff have been significantly expanded in local government organizations; their status has increasingly risen, job security enhanced, and payment levels match those in the private sector.

Japan has made much use of imported technologies to form the basis of pollution control technologies such as water supply, sewerage and combustion system. However, industrial pollution control required new technological development and introduction of appropriate technology to individual factories. Development and expansion of technology have been implemented by public and private sectors working together since the latter half of the 1960s. Government has played a major role in developing a pollution control equipment industry. Air and water pollution control technology was introduced and developed by the joint efforts of government and industry. Furthermore, technical information for small- and medium-sized industries such as guidelines for pollution control technology has continued to be an important responsibility provided by engineers in local governments.

Environmental education in primary, secondary and high schools has been accelerating. National education on environment has also been promoted by issuing Annual Reports on Environment, and setting up "environmental weeks". Local public bodies also support volunteer activities which try to improve environmental living conditions. Observation activities and dissemination of household account books on environment are other measures. However, undoubtedly the most important means of generating pubic awareness about environment has been coverage by the mass media.

The national government also provides valuable support with regard to standardization and approval of pollution control technology. All environmental measurements are carried out using methods standardized according to the Japan Industrial Standard (JIS). Local governments and business establishments can undertake pollution control measures, using common standards of evaluation and measurement, so that comparability can be assured. In 1975, a registration system was introduced for all business establishments authorized to approve environmental measurement. Official environmental data submitted to national and local governments must be measured by registered business establishments.

Rehabilitation Works and Compensation Schemes

Japan has had for many years a system for rehabilitating land areas after the shutdown of mines, by using funds that are collected from mining operations, according to their size. Until recently there was no similar system for rehabilitation or compensation for damage caused by industrial pollution. Consequently, landowners, polluters and the local government carried out rehabilitation on an ad hoc

basis, and damage costs were reimbursed by mutual agreement or through lawsuits. However, a compensation system for pollution-related health damage was set up in 1969 and, following the Yokkaichi asthma case, a pollution-related Health Damage Compensation System was established in 1974.

Under this system, polluters therefore share expenditures such as medical expenses with those who are damaged by pollution. This system was acceptable to enterprises which were becoming increasingly subject to neighborhood lawsuits, but has been criticized by victims on the grounds that the amount of compensation has been insufficient. An important characteristic of the compensation procedure in Japan is that if sources of pollution cannot be pinpointed accurately, victims may obtain compensation from the government. The compensation fund is derived from the general sources of pollution, such as automobile owners and specific polluting industries; the latter pay into the fund according to type and quantity of pollutants emitted, location, and so on. Since the Health Damage Compensation Law requires companies to contribute to the compensation fund based upon their emission of pollutants, the burden for financing the fund is shifted to companies with improved systems, thereby providing a strong incentive for modernization and upgrading of facilities.

Another law concerning the requirement that entrepreneurs should bear the cost of public pollution control works was enacted in 1970. Under this law, enterprises causing pollution must share the cost of pollution control work carried out by local governments. Such works include improvement of water quality in rivers and bay areas, dredging operations, railroad noise abatement measures, and creation of green buffer zones.

Energy Policy

In addition to the underlying macroeconomic, political and cultural determinants of environmental performance and the range of specific environmental policy instruments referred to above, there are many policies at the sector level which, often unintentionally, have had a major impact upon Japan's environmental situation. Perhaps foremost among these has been Japan's energy policy.

Energy policy has contributed to industrial pollution improvement in a number of ways, especially air pollution (directly) and water pollution (indirectly). The switch from coal to heavy oil in the 1950s; the subsequent use of low-sulfur heavy oil, and then the change from heavy oil to LNG and atomic energy have represented various phases in Japan's energy policy. Stimulated initially by the oil crisis in the 1970s, a strict energy conservation policy has developed. Assisted by technical and financial assistance from government, and more rational pricing policies (see next paragraph), industry has been encouraged to integrate energy efficiency and conservation measures throughout their production processes. Air and water pollution loads have declined sharply as a result.

In the 1950s and 1960s, charges for electricity had been set at low rates to promote industrial growth, and large consumers were treated particularly favorably. Declining block rates, or promotional rates, in which the larger the consumption, the lower the price at the margin, were common. However, in the 1970s, rapidly increasing costs led to substantial increases in energy prices, and introduction of progressive charging systems. In addition, all of the ten power companies in Japan have introduced peak load pricing for certain classes of consumer. The explanation for the increase in energy prices is quite straightforward. The increase in international oil prices in 1973 in a country almost totally dependent upon imported fuel, had to be reflected in domestic price increases. Since that time, domestic electricity prices have gradually declined. However, they have been maintained in real terms: the continued appreciation of the yen (reducing the effective price of imported fuel) is the explanation for this trend. Average charges for electricity supply over the last two decades are shown in Figure 5.5.

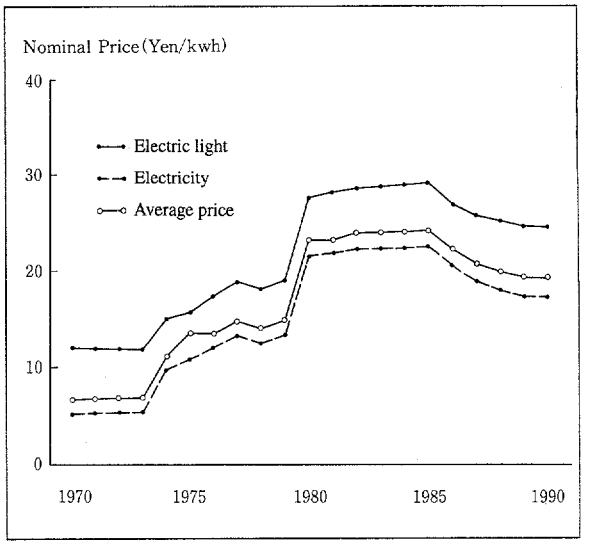


Figure 5.5: Average Charges for Electricity Supply in Japan 1970-90

Source: Federation of Japan Electric Industry

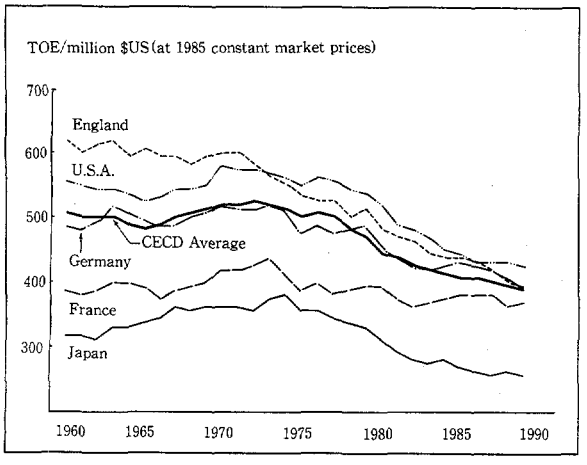
The above policy recognized that while various measures to encourage efficiency, such as education, guidance, and appeals to social conscience, were extremely important, they were not enough. Regulations and advice need to be combined with measures to make it in the financial self-interest of consumers to be efficient in their use of water and energy.

The change to a progressive charging system plus the general increase in rates, has now resulted in highly efficient energy use in Japan, and has been a major contributor to the decrease in air pollution and water pollution loads. This is a classic example of a policy which satisfies numerous objectives; fiscal and financial (by raising revenue); economic efficiency (by reducing wasteful use of scarce resources), and, of course, environmental. Energy consumption per unit of GNP for Japan has consistently been far below that for other OECD countries in recent years, as shown in Figure 5.6.

Such comparisons however must be interpreted with care. The GNP figures used here are not based on purchasing power parity. Structural differences in economies are also important explanations of inter-country differences in energy use. Such comparisons are particularly difficult to interpret with respect to developing countries. Thus, while commercial energy consumption is relatively accurately recorded, developing countries often have large non-market economies, which tend to overstate the relative size of energy consumption. On the other hand, non-commercial (poorly recorded) energy consumption is also often significant.

Figure 5.6: Primary Energy Consumption per Unit of GNP in Japan and other OECD Countries (1960-90)

Source: OECD



Perhaps a more useful indicator is the amount of energy required to produce certain outputs. As shown in Figure 5.7, Japan has shown major progress over the last two decades in reducing the amount of energy used per unit of output in major manufacturing sectors, such as pulp and paper, steel, cement and petrochemicals.

Industrial Water Supply

There are similarities between energy and water policy in Japan as they impact upon the environment. In both cases, the real costs of consumption have been increasing over time; policies to induce more efficient use for economic or financial reasons have also had beneficial environmental consequences. Those policies have essentially rested upon increasing the costs to consumers, and in particular to the hitherto subsidized industrial users.

Up to 1950, many factories in the coastal areas of the large cities heavily exploited groundwater resources, and discharged the effluent into rivers and coastal waters without any treatment. Until this time, apart from pumping costs, the factories incurred no cost for water supply or its disposal. However, pumping up large amounts of groundwater caused ground subsidence in coastal areas and the consequent enlargement of the areas in which ground height was under the sea surface, which also resulted in extensive flood damage, particularly during the typhoon season. This has been a particularly severe problem in Osaka.[11] In light of this, the Industrial Water Law was established in 1956; the regulation of underground water pumping was strengthened, and development of industrial water supply systems as a substitute water source took place.

In developing industrial waterworks, large factories estimated their future water needs and submitted this information to the industrial water undertaking organization (primarily operated by local governments). The factories paid for part of the investment costs as they were incurred, subsequently paying a periodic lump sum for water, based upon the contracted amount, as long as total consumption was actually less than the contracted amount. However, because of the decrease in water demand caused by energy conservation and development of overseas production bases, actual water demand was much less than that estimated. So the factories had surplus water sources at their disposal, and did not make any effort to introduce even low cost water rationalization schemes.

As economic growth accelerated, placing pressure on existing water resource capacity, and as pollution problems became more serious, the need for greater efficiency in water use was recognized. The water charging sys-

tem was then changed from the contract water quantity system into one based upon actual consumption. At the same time, large increases in industrial water charges were introduced. Since then, prices have in general been maintained in real terms (see Figure 5.8). Combined with expansion of sewerage systems, and the accompanying requirement that firms discharge waste into them (for a fee) rather than discharge waste into rivers, this policy has created the incentive for efficient water use and effluent reduction by companies, resulting in the reduction of the factory effluent load. Further measures were taken in 1975 to restrict new abstraction of ground water, and the areas in which this is permitted have been continually reduced ever since.

Other Sectoral Policies

Transportation Rehabilitation of railways, and construction of major highways, rapid transit systems such as the Shinkansen ("Bullet train"), and other transportation infrastructure such as harbors and airports, have all contributed to the industrial decentralization. In urban areas, railways have been constructed mainly by the private sector, and land development along the railways has tended to form the core of large cities. Railway development has had an important role in restraining automobile growth and its resulting pollution. Government policy has been to encourage mass transit by means of a large amount of investment into national railways and favorable treatment for land acquisition, subsidies, reserve fund for construction and maintenance of private railways.

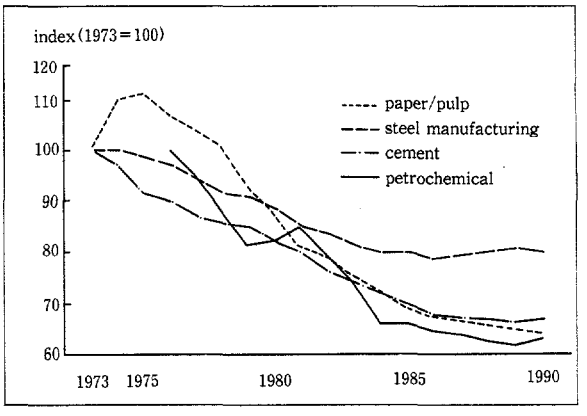


Figure 5.7: Energy Consumption per Unit of Production (by Weight): Standard Products of Major Industries (1973-90)

Industrial Policy and Land Reclamation

Industrial concentration along the Pacific belt area dates from the years prior to World War II. During the rehabilitation period after the war, industrial concentration in this area developed still more. In the 1970s a new industrial structure started to emerge; industrial decentralization took place, accompanied by a change from heavy industry to high technology and machine industries. The emphasis upon heavy industry in the earlier period was a cause of major environmental problems with subsequent changes in industrial structure easing them considerably.

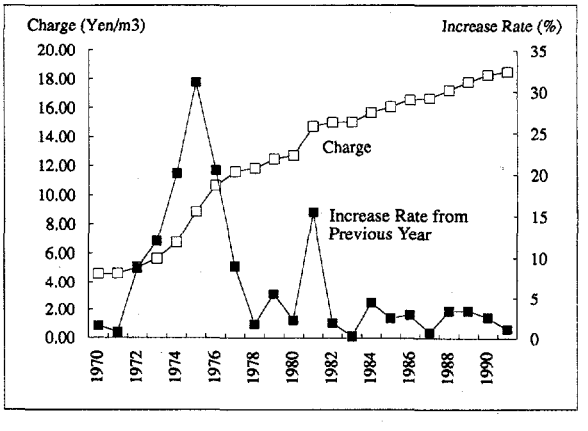


Figure 5.8: Average Charges for Industrial Water Supply in Japan 1970-91

Source: MITI

The policy of acquiring industrial land by reclamation of coastal areas has contributed to industrial development as well as rapid and large-scale destruction of the natural environment in coastal areas. However, land reclamation has contributed to improvement of urban and industrial pollution through providing lands for sewage treatment and final disposal facilities, relocation of small- and medium-sized industries in urban districts, and establishment of parks.

Agricultural Policy In the agriculture sector, the large landowner system that had prevailed until the end of World War II was changed under reforms implemented under the post-war occupation. In the 1950s, the agricultural population was nearly 50% of the total labor force, and the growth of powerful farmers' organizations such as the agricultural cooperatives made the political influence of farmers extremely effective. Reflecting this political power, Japan's economic policies have emphasized agricultural protection; trade, fiscal, and urban policies have all combined to protect and enhance, not only agriculture, but fishery and forestry.

Protection of these sectors has often been at the expense of other development activities in rural areas and has therefore helped to control environmental degradation caused by industrialization and urbanization. Hydrologic conditions provide further rationale for the economic protection given to rice growers, whose activities play a major role in water resource management. Certainly, abandonment of rice operations would require massive compensatory expenditures on flood and pollution control, and in water supply schemes. More conventionally, continued protection of traditional water rights and controlled use of common property (forests and fishery) has, in effect, also been an important instrument of environmental management.

Water Resources Policy and Policies for Forestry Conservation and Flood Control Some forests, which are important for water management, and control of landslides and flooding, receive special protection. This has contributed not only to conservation of the forests themselves, but also protection of wildlife, and to reduction in soil erosion, and silting up of reservoirs. Large-scale water resource development schemes, such as multi-purpose dams have, however, damaged the ecology of rivers; thus, although the water quality in rivers has improved by the introduction of environmental measures, other natural conditions have in many cases deteriorated irrecoverably.

Footnotes:

[9] Note: Investment Scale Proportions of Sub-Components are as follows:

Investment Components	Approximate Proportion
1. Sewerage piping & sewage treatment facilities	
a. Sewerage piping	80%
b. Sewage treatment facilities	20 %
c. Total (a + b)	100 %
2. Solid waste management facilities	
a. Waste collection and haulage (vehicles and transfer stations)	15 %
b. Treatment (mainly incineration)	70 %
c. Final disposal	15 %
d. Total (a + b + c)	100 %
3. Human waste management facilities	
a. Collection & haulage	14 %
b. Treatment	85 %
c. Final disposal	1 %
d. Total (a + b + c)	100 %

1. Proportions of sub-components are rather constant over time.
2. Proportions of the Government subsidies and loans change by types of components, but do not change much by types of sub-components except for vehicles for collection of solid waste and human waste for which no subsidies may be provided.

[10] See Case Studies.

[11] See Case Studies.

Integration of Environment into Industrial Policy

Japan's rapid progress in carrying out pollution control measures in the 1970s owes much to the conscious efforts of the MITI to build environmental considerations into industrial and energy policy and operations rather than as treating environment as an "add-on". Although MITI and the Environment Agency often differ over the degree to which environmental measures should be taken, once agreement has been reached, MITI's contribution is generally positive. Since the 1970s it has promoted pollution control technologies, assisted in the development of an environmental sanitation and pollution control industry, and facilitated joint industrial pollution measures with enterprises.

In the early years of the government's efforts to address environmental problems, there was a tendency to react on an ad hoc and unsystematic basis, often under pressure from public opinion, to the most obvious problems arising from industrial activity or urbanization. This was obviously an inefficient and costly procedure; however, this situation has changed radically during the last thirty years or so, and the strategy now is clearly to adopt a preventive rather than curative approach. The integration of environment into industrial development policy now involves continual close collaboration and negotiation between government and industry, with national and local governments providing finance and technical assistance and introducing economic incentives and regulations, in order to simultaneously address the objectives of environment, energy efficiency, and industrial development.

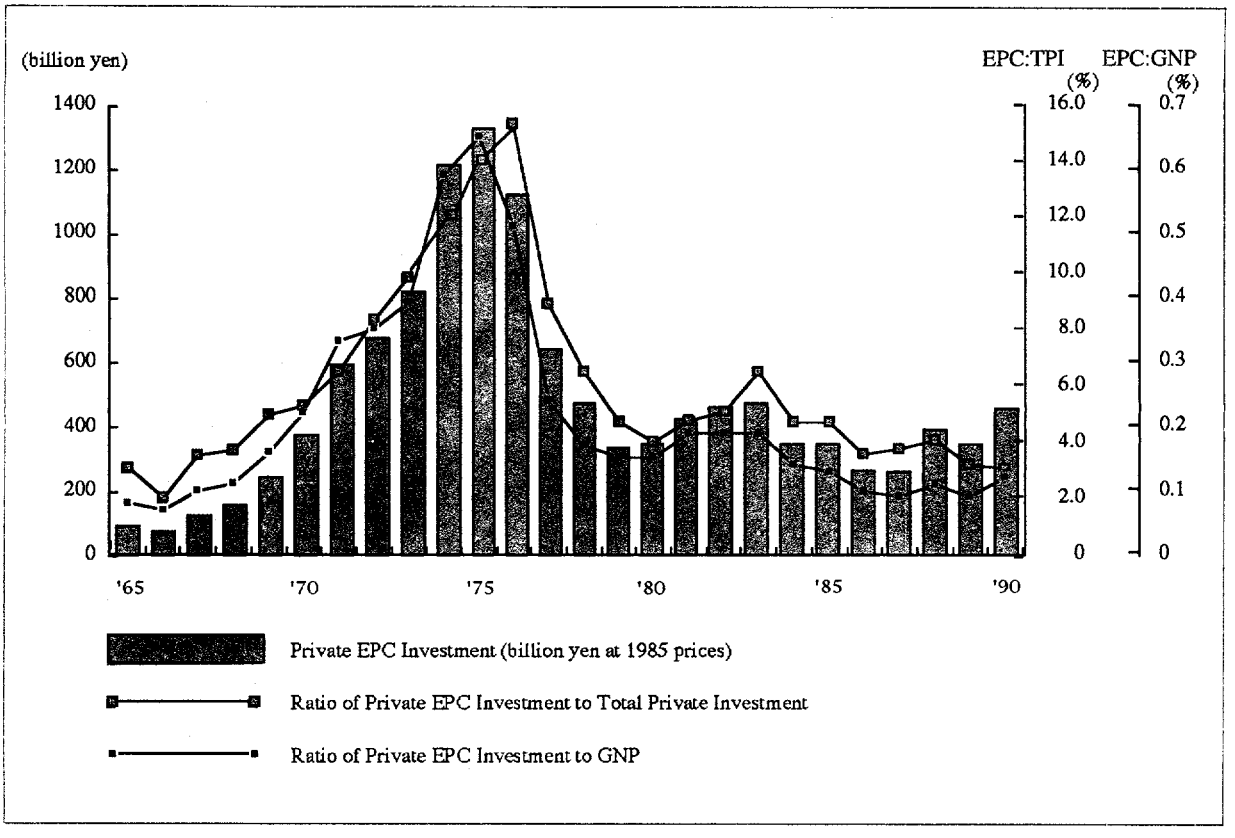
Investment in Pollution Control

Perhaps the best indicator of how industry has responded to environmental concerns in recent years is the amount that has been invested in pollution control equipment. The pattern of investment has differed systematically between large scale industry, dominated by the mining and manufacturing sectors (defined here to include electric power and gas), and small and medium size industry. Expenditures on pollution control by large and small industries are discussed separately below.

All Industry Figure 6.1 shows an interesting pattern of investments in pollution control by large scale industry over the period 1965-1990. It will be seen that investments started to become significant in the late 1960s, peaking sharply in the mid-1970s, with smaller year to year changes taking place in subsequent years. At their peak, in 1975, investment in pollution control was about 1,300 billion yen, or about 14% of total private investment and 0.63% of GNP in that year. In 1990, the figures were about 460 billion yen, 3.1% of total private investment, and 0.12% of GNP.

In view of the huge investment in environmental pollution control in the mid-1970s, the policies, attitudes and motivations at that time are critical in explaining Japan's success in dealing with industrial pollution matters. It is

Figure 6.1: Investment in Pollution Control: All Industry 1965-90



Sources: MITI and Japan Research Institute (Original investment data at current prices)

at first sight surprising to note that the investment peak came two years after the 1973 oil crisis that depressed the Japanese economy so severely that it recorded a negative economic growth rate in the following year (the only year since World War II that this occurred). One reason for the investment peak in 1975 was that a regulation to control SOx emissions began to be implemented in that year. This however was compounded by another factor: the increase in international oil prices triggered immediate increases in domestic fuel costs, which stimulated extensive reorganization of industrial processes in order to achieve greater fuel efficiency. It was in many cases convenient and efficient for firms to introduce environmental protection measures at the same time as general production changes were taking place. The decline in pollution control investments following 1975 was followed by increases again during 1981, 1982 and 1983, which again were in part attributable to a further round of oil price increases, and the accompanying investments in energy conservation.

There are other possible explanations as to why investment in pollution control peaked in the mid-1970s, some years after the introduction of the Basic Law. One is the stimulus afforded by the results of the court cases relating to the serious pollution incidents which were concluded in first half of the 1970s. As far as air pollution control — the prime target of private industry — was concerned, the initial response to the Basic Law, the Air Pollution

Type of Industry	1974	1990
Power	18%	65%
Chemicals	18%	3.8%
Steel manufacturing	17%	8.4%
Oil refinery	13%	3.0%
Paper and Pulp	5%	3.6%
Others	29%	12.5%
Total	100%	100%

Table 6.1: Private Pollution Control Investments in Manufacturing and Mining Sector

Control Law, and associated regulations was of course to take the easiest and cheapest measures first. For SO_2 reduction, this was substitution for high sulfur content fuels. By the mid-1970s these opportunities had been exhausted, and continued improvement in standards required very expensive desulfurization equipment. Indeed, at this time, investment in desulfurization equipment, primarily by the power industry, dominated industrial investment in pollution control.

Although 1975 was a peak year for investment in SO_2 reduction, it had an apparently small effect on recorded emissions and ambient quality at that time. A possible explanation for this is that most of the investment was carried out in power stations. These were often located in rural areas, but monitoring stations were primarily located in urban areas. Another explanation could be that economic growth at that time was extremely rapid: tightening of emission controls for individual plants could be entirely consistent with aggregate increases in emissions.

Predictably, the bulk of investment in pollution control was and continues to be in the manufacturing and mining sector, which currently carries out about 80% of such investments. Between 1974 and 1990 there have been substantial changes in the relative importance of pollution control measures in various sub-sectors. Table 6.1 shows that while in 1974 three types of industry (electric power, chemicals and steel) accounted for about half of total pollution control investments, by 1990, investment in the power sector alone accounted for 65% of the total, this being mainly for SOx and NOx and SMP removal facilities.

Paralleling the overall trend, pollution control investments in the manufacturing and mining sector fell from 14% of total investment in 1974 to 3% in 1990. Also, while in 1974, the power sector invested 47% of its gross investment in pollution control, it was only 4.9% in 1990. Similarly, while investments in pollution control in oil refineries, chemicals, and paper and pulp were 27%, 25%, and 24% respectively of total investment in 1974, by 1990, the comparable figures were 1.8%, 2.2% and 6.0%.

The above data refer to total pollution control investments, including both equipment

and civil works. As far as actual pollution control equipment (roughly half of the total pollution control investment) is concerned, in the mid 1970s 60% was for desulfurization facilities, and 30% for prevention of water pollution. Current (1991) distribution of pollution control investment by large scale industry is quite similar to that in the mid 1970s, i.e., 61% for prevention of air pollution, and 30% for prevention of water pollution.

Small and Medium Size Industries It is estimated that small and medium size industries (SMSIs)[12] which employ 79% of the labor force and produce 62% of total output in Japan, are responsible for roughly 20% of all private sector investment in environmental pollution control. According to a survey made by Japan Research Institute, 60% of the SMSIs judged that pollution control facilities were required in their enterprises, of which about 93% had actually invested in them. In contrast to large scale industry, whose main investment has been in air pollution control measures, followed by water pollution, SMSIs largest investments were made for prevention of water pollution, followed by prevention of air pollution and then noise pollution. This is attributable to the fact that many of the SMSIs are engaged in food processing industries, which are large water consumers, as are the plating, dyeing and leather industries.

There is not much difference in the ratio of pollution control to total investment between SMSIs and large industries. However, the ratio of SMSIs general investment amount relative to sales value of products is about 15% of the corresponding ratio for large industries. Therefore, SMSIs investments in pollution control relative to sales value of products is also about 15% of that for large scale industry.

A variety of factors explain decisions to invest in pollution control equipment. Just as large scale industries took the opportunity of making pollution control investment coincide with reorganization of productive processes necessitated by energy price increases, SMSIs have often invested in pollution control when they have relocated. Indeed, government policy of relocating SMSIs has often been dominated by environmental concerns; the relocation itself combined with process changes and modernization have been powerful means of bringing about environmental improvements.

As described in more detail in the Case Studies, the main reasons for relocation included the necessity of modernizing production processes in the 1970s; strong neighborhood protests against pollution; and a variety of financial incentives provided by government. The latter included availability of inexpensive land; favorable prices for vacated premises; and low interest loans for moving and modernization.

A survey conducted by the Japan Research Institute found that a number of other factors also explained SMSIs decisions to invest in pollution control equipment. These included improvement of corporate image; residents' complaints; tighter enforcement of regulations; and instructions or advice from government or trade associations. Technical issues were also an important explanation; in addition to the

opportunities afforded by relocation, process changes and introduction of new technology; expansion of production capacity; and obsolescence of existing pollution control facilities were also significant determinants of investment. Although the survey only related to SMSIs, similar findings would almost certainly result from a survey of large scale industry.

Financing Pollution Control Investments in the Mid-1970s As described above, by the mid-1970s a combination of regulatory and economic forces had resulted in huge investments in pollution control, which at one stage reached 14% of total investment in the manufacturing and mining sector. This placed great pressure, not only upon the financial, but also the technical capacity of Japan's industrial sector. New mechanisms were required to ensure that funds were available to industries to improve their environmental performance, and at the same time ensure that those funds were used as efficiently as possible.

Achievement of these objectives was facilitated by the lending operations of a number of public agencies, all of which loaned funds at subsidized interest rates. These agencies, the Japan Development Bank, the Japan Environment Corporation, the Small and Medium Enterprise Finance Corporation, and the National Finance Corporation, between them made available about one third of the investment funds required for pollution control investment in the 1975 peak year. (See Table 6.2 below). As has been observed earlier, while the Japan Environment Corporation was not the largest lender, it has played a major role in ensuring the technical soundness and cost-effectiveness of specific pollution control investments. While specializing in the financing of end of pipe pollution control facilities, the work of the Japan Environment Corporation has been complemented by that of the other lending agencies which, in assisting industries in plant modernization and upgrading, play an equally important role in overall environmental improvement strategy.

Two thirds of the cost of pollution control investment was from industry's own resources, including commercial bank borrowing. In the

LEADING INSTITUTION	INTEREST RATE	REPAYMENT PERIOD	MAXIMUM LOAN AMOUNT	LOAN AMOUNT (Billion Yen)
1. Japan Development Bank	8.0%	10 years	50% of investment	72.3
2. Japan Environment Corp. (JEC)	6.85%	10 years	80% of investment	26.5
3. Small & Medium Enterprise Finance Corporation	7.0%	10 years	15 billion per loan	18.0
4. National Finance Corporation	7.0%	10 years	1.8 billion per loan	1.7
5. Total (1+2+3+4)				318.5(34%)
6. Commercial Banks	9.1%			
7 Gross Private Investments in EPC				928.6 (100%)

Table 6.2: Government Lending for Pollution Control Investments (1975)

Source: OECD

mid 1970s the ability of firms to invest heavily in pollution control was facilitated by the fact that the technologies were well known and established, and the increase in Japan's international competitiveness allowed them to cope with increasing standards and costs. For the domestic market, achieving uniformity of action within industrial groups was an important characteristic of industry's response. Self interest also provided a necessary impetus; legal regulations became stricter, the principle of liability for damage became increasingly established, and demands grew for industry to show evidence of social responsibility.

Potential costs of not taking anti-pollution measures include suspension of business operations if effluent and noise standards are not met; cost of compensation for damages caused by pollution; damage to production equipment caused by pollution (metal corrosion, etc.); and decrease in product sales due to the lowered image of the enterprise. Another important consideration is the impact of poor environmental practice on the working conditions, well-being and productivity of employees. While the Industrial Safety and Hygiene Act strengthened measures to protect workers, the general improvement in environmental management within enterprises has itself had a beneficial impact; the overall improvement in the record of occupational health with regard to pollution is indicated in Figure 2.9 above. These measures also had an educational aspect, in that they contributed to the enhanced awareness of unions, engineers and management as to the adverse effects of industrial pollution.

Impact of Pollution Control Expenditures on Production Costs

The financial impact of carrying out environmental protection measures obviously varies considerably by industry. In the mid-1970s, the costs of pollution control were very high for certain industry groups, and as Figure 6.2 shows, this had at that time a considerable impact on their profitability. Thus company profits in the textile and steel industries were reduced in years of peak pollution control investment by over 90%, while for non-steel metals, substantial losses were incurred as a result of such investment. Subsequently, however, the impact of pollution control expenditures on costs and profits is shown to have declined sharply, eventually becoming insignificant.

The various support mechanisms offered by government referred to in Chapter 5 were critical in determining the ability and willingness of these industries to invest heavily in pollution control in the mid 1970s, for in many cases these measures permitted them to remain competitive. In the case of electric power, the utilities were in effect local monopolies, and although they incurred exceedingly high pollution control costs, they were able to pass much of this burden on to the consumer. Figure 6.3 shows the gloomy prediction of the electric power industry about the impact on its profits if SOx and NOx standards were enforced in the mid 1970s. In the event, apart from one year, actual profitability was virtually unaffected by the heavy investment in pollution control by this industry.

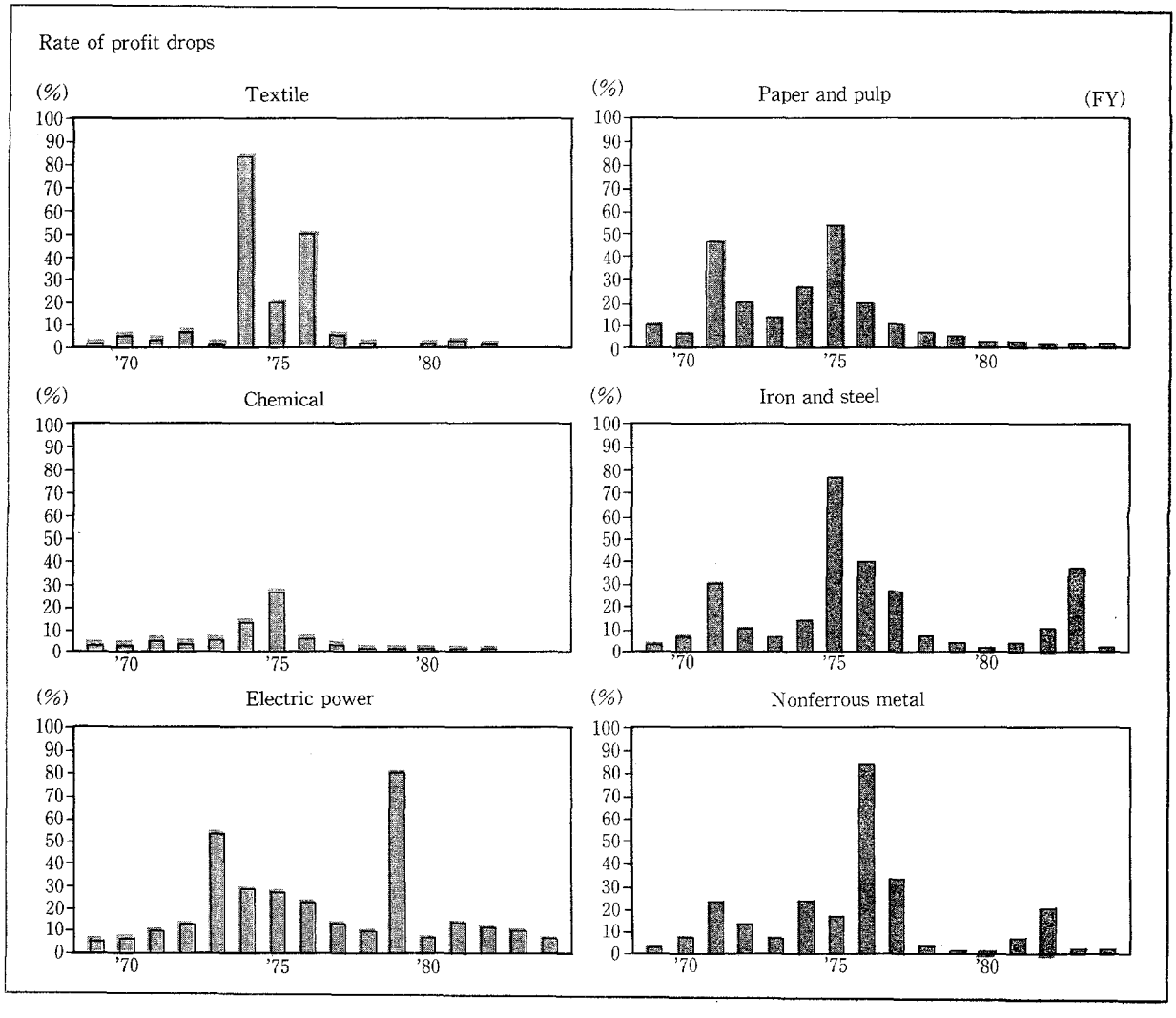


Figure 6.2: Trends in the Impact of Pollution Control on Company Profits: Selected Industries 1969-84

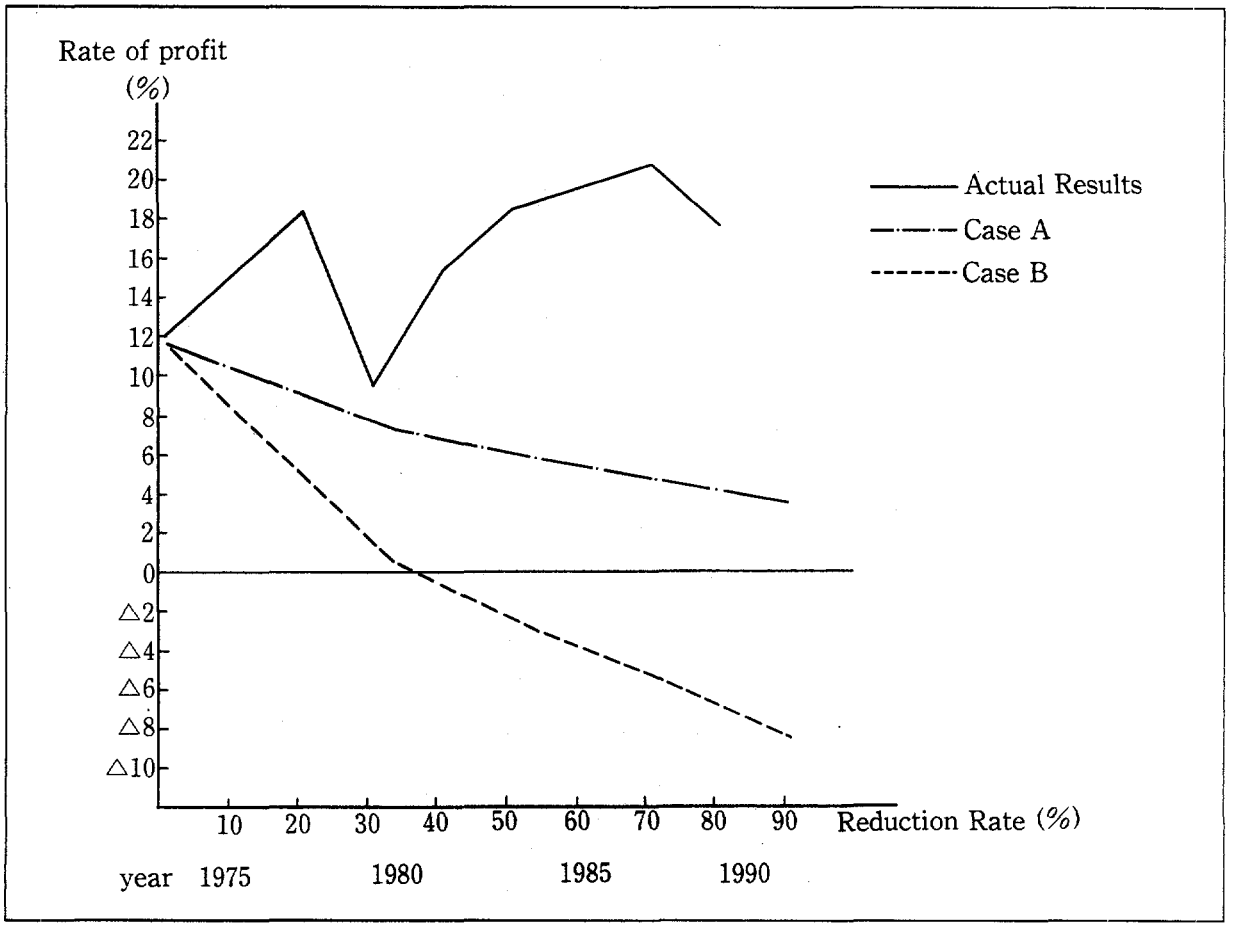
Source: Prepared by the Yearbook of Corporate Statistics and the Japan Development Bank, "Survey on Trends in Investments in Facilities and Equipment"

Note:

Left axis shows "rate of profit drops by added outlays for pollution control = added outlays for pollution control / (added outlays for pollution control + pretax net term profit).

At the present time, the economic impact of pollution control expenditures on the mining and manufacturing industry as a whole are relatively small. In 1991, pollution control costs (including both capital and operating costs) were estimated to be 0.7% of value added in the mining and manufacturing industries, here defined to include electricity and gas. In the case of electric power, pollution control was estimated to be 6.1% of total production costs. In 1967, the Economic Planning Agency (EPA) estimated average ratios of desulfurization costs relative to product production costs for various industries. Assuming a unit desulfurization cost of 1,000 yen per kilo liter of fuel, the estimated average ratios were 0.39% in the mining and manufacturing industry, 0.19% in agriculture, forestry and fishery, and 0.11% in transport and traffic sector.[13]

Figure 6.3: Predicted and Actual Profitability of Electric Power Industry Following Enforcement of Higher Emission Standards



Source: MITI and Japan Development Bank

Notes:

Case A - SOx Control only
Case B - Both SOx and NOx Control

Product prices consist of many cost elements, including raw materials, energy, transport, land, machinery, labor, safety measures, sales promotion, administration, licenses, insurance, advertising, and environmental pollution control. In addition, there are various price variation factors including rates of foreign exchange, taxes, tariffs, and interest rates. The magnitude of the variation of some of these factors has been very large over time. In particular, the yen has continually appreciated over the last two decades. The domestic price of oil which was 55,000 yen/kilo liter at its highest level in 1982 decreased to 12,000 yen/kilo liter in 1988, 22% of the 1982 price. Compared to the size of these price fluctuations, the additional costs incurred by industry in achieving pollution control objectives have been very small.

In any case, product prices have often been reduced through technological innovation. Japanese industry has constantly improved its international competitiveness since World War II through innovations in product manufacturing and energy conservation. Environmental management in particular has benefitted from technological innovation both directly, through

(Unit in Million yen)

Polluters	Type of Pollution	Annual Cost of Environmental Damage to Polluters (A)		Annual Cost of EPC Measures (B)	Benefit-Cost Ratio (C)
1. Oil Company in Yokkaichi	Air Pollution SOx	1) Compensation to victims for health damage:	21,007	14,795	1.4
2. A nitrogen Fertilizer Producer Minamata City	Water pollution organic mercury	1) Compensation to victims for health damage:	7,610		
		2) Cost of removal of polluted sea bed of Minamata Bay:	4,271		
		3) Compensation to fishermen:	689		
		Total:	12,570	123	102
3. A Zinc Mining Company at Jintsu river	Contamination of soil with cadmium	1) Compensation to victims for health damage:	743		
		2) Compensation to farmers:	882		
		3) Cost of cleaning of polluted agriculture land:	893		
		Total:	2,518	662	4.2

Table 6.3: Costs and Benefits of Pollution Control Measures:Three Serious Pollution Cases

the production of increasingly efficient and cost-effective pollution control equipment, and indirectly, through general industrial process improvement and plant modernization which results in more efficient use of raw materials, less generation of waste, and higher quality products.

Financial Justification and Macroeconomic Impacts of Pollution Control Expenditures

Japanese experience has demonstrated a variety of scenarios by which the impact of pollution control expenditures may be judged from the private industry perspective. There have been an exceptional number of cases where firms can justify investment in pollution control without legal pressure because they are financially feasible. An excellent example is provided by an edible oil company in Yokohama that invested in new manufacturing technology that contributed to energy saving, reduction in manpower requirements, and major reduction in the emission of pollutants. An extremely high rate of return was obtained from these initiatives. (For a summary see Annex 19, *Profitable Investment in New Production*

Technology and Pollution Control: An Edible Oil Manufacturer.[14]

Investment in pollution control actually increases production costs in most cases; nevertheless such investments may be justified because they will permit the company to avoid costly litigation, liability for damages, and other costs. In other words, the costs of pollution control are smaller than costs arising from not complying with the environmental laws such as penalties and compensation to victims, as well as possible decline in sales due to lowered corporate image. Indeed, there are numerous examples, as described in Annex 10 (Details of Key Court Cases) in which extremely heavy damages have been paid by polluting firms.

Some estimates have been made of the compensation costs that firms would have incurred or avoided depending upon whether or not pollution control measures were in force.[15] For example, one study estimated that the costs of compensation to victims of SOx air pollution throughout Japan would be 12.6 times the cost of desulfurization and fuel conversion if these improvements had not taken place. Other examples of the high costs incurred by industry as a result of three serious pollution court cases, and a comparison with the costs they would have incurred in investing in environmental pollution control (EPC) measures are shown in Table 6.3. Although one cannot generalize from the results, these are cases in which prevention would clearly have been preferable to cure, not only in humanitarian terms, but also in financial ones. Thus the benefit-cost ratio of taking preventive measures varies from 1.4 to 102.

Much therefore depends upon the extent to which the government actually implements a pollution control policy, or whether those damaged can obtain compensation through the court system. Clearly, this works in Japan; a willingness to not only follow national guidelines, but indeed to enter stricter agreements with local authorities suggest that the firms see this in their own interest. To some extent this tends to result in a fairly efficient determination of standards, since externalities are internalized by the court system.

Note however that the compensation paid through court cases — and therefore the damage estimates in Table 6.3 — has to date been very conservative, with 80% of lost earnings being the usual limit. It clearly ignores other pain and mental anguish, as well as damage to property. However, where firms can ignore environmental laws and standards, it follows that much less than optimal investment in pollution control from a societal point of view is likely to be achieved. Indeed, since compensation is less than total damage costs to society, industrial acceptance of existing standards implies that the latter, and therefore actual pollution control expenditures, are generally readily justifiable in social cost-benefit terms.

It is therefore likely that investment in pollution control by the private sector, which is subject to the discipline afforded by the prospect of litigation as described above, can be expected to be quite efficient in size and scope. This however is less likely in the public sector; while government may also be subject to court action for damages caused, it does not have the profit incentive to avoid over-investing in environmental management, for example, in highly expensive incineration.

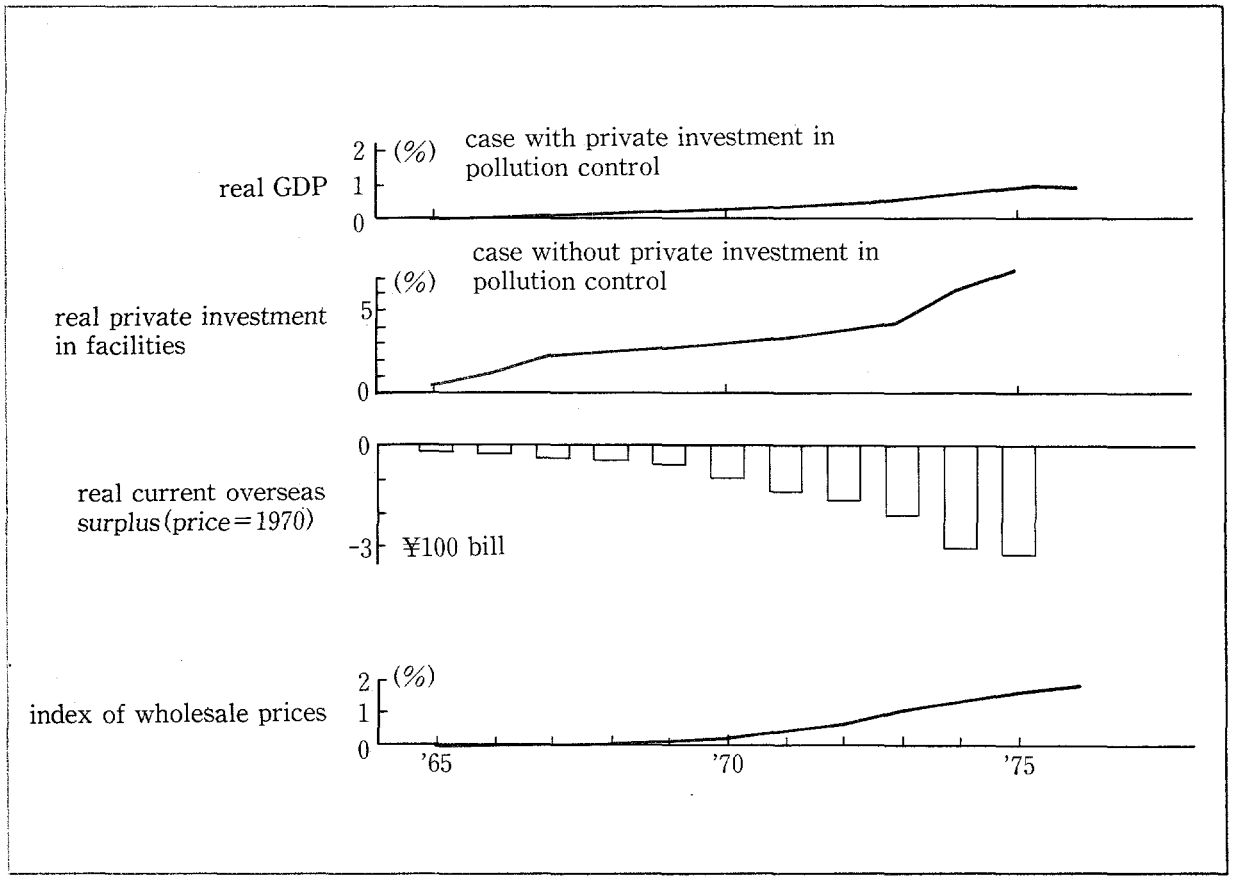


Figure 6.4: Economic Consequences of Private Investment in Pollution Prevention 1965-75

Notes:

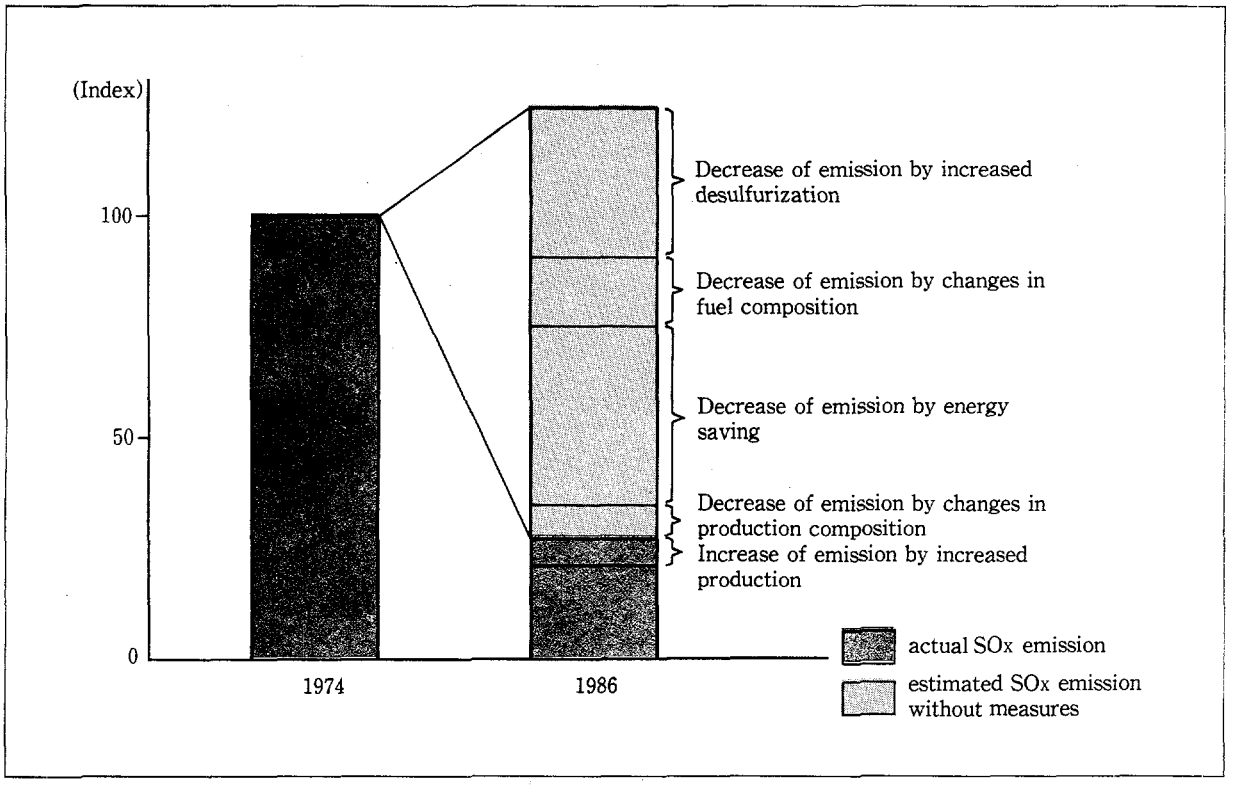
1. Estimated by the integrated environmental model of Environmental Agency.
2. After simulating two cases; with private investment in pollution control and without private investment in pollution control, the results (differences) are shown in terms of rate and real value.

Finally, efforts have been made to estimate the various macroeconomic impacts of private investments in pollution control. The integrated economic-environmental model developed by the Japan Environment Agency was used to simulate two scenarios; one with private investment in pollution control, and the other without such investment. The impact of the pollution control investment on a number of indicators over the 1965-1975 period was estimated, the results being summarized in Figure 6.4. This shows, among other things, that private investment in pollution control slightly increased real GDP; it also was slightly inflationary; and it reduced the real current overseas surplus. This time was the period of rapid investment in environmental pollution control. The subsequent reduction in investments would show a drop-off in these graphs.

Other Incentives: Electricity and Water Pricing

The reaction of the Japanese government to the 1973 oil crisis and at around the same time to

Figure 6.5: SOx Emission Reduction by Measure



Notes:

1. Prepared by Environment Agency.
2. For the index, the emission of 1974 is set at 100.

the increasing real costs of industrial water supplies prompted a reappraisal of the existing policy of subsidizing industrial enterprises by electricity and water prices that were less than the economic cost of supply. The large increases, referred to in Chapter 5, have been extremely important in inducing firms to be more efficient in their use of energy and water resources, and this has had a beneficial environmental impact. In particular, it has been extremely important in stimulating the use of cleaner production technologies and those which reduce wasteful use of energy and water.

Indeed, it has been[16] estimated that the decline in industrial air and water pollution owes more to energy efficiency improvements, brought about in large part by price reform, than to specific environmental regulations. Thus the introduction of cleaner industrial production processes appear to have been much more significant in reducing pollution loads than "end-of pipe" measures (Figures 6.5 and 6.6).

A similar set of conclusions can be drawn about the industrial water supply pricing reforms of the mid-1970s, which were combined with an expansion of sewerage systems, and the accompanying requirement that where available, industries should connect to them, and pay for the collection, treatment and disposal costs involved. This increase in the cost of

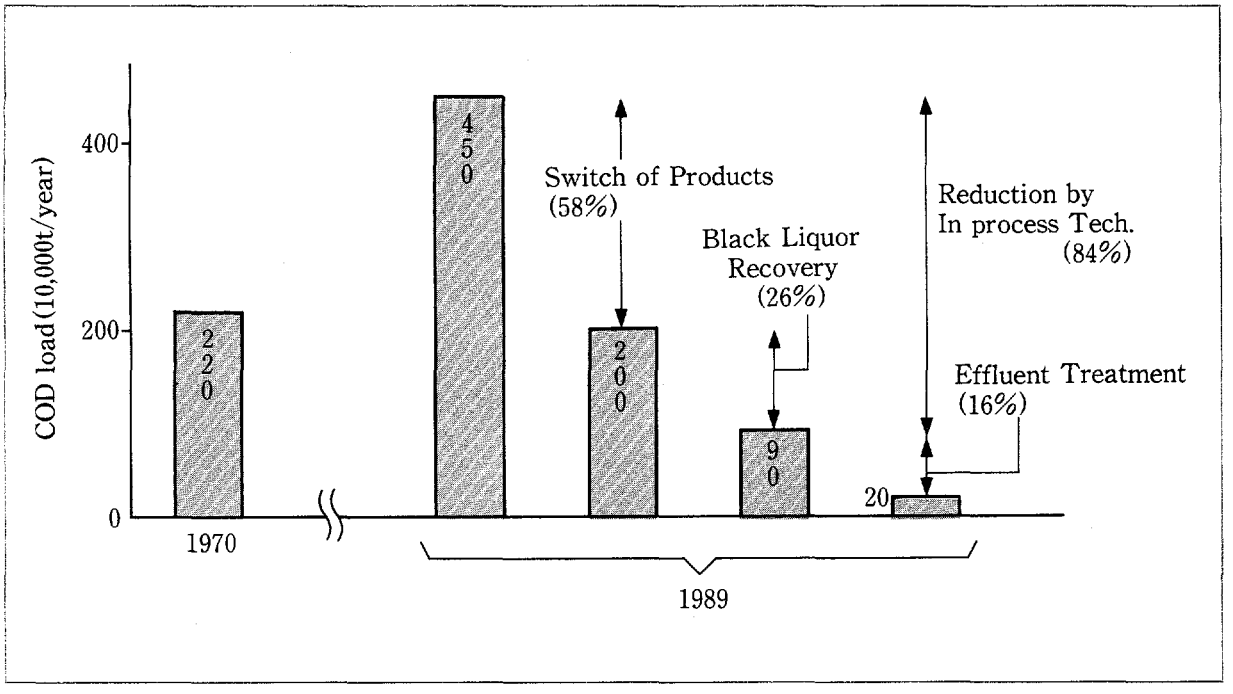


Figure 6.6: COD Load in Paper and Pulp Industry (1970 and 1989)

Notes:

The largest bar in 1989 shows the estimated COD load with measures. The rightmost bar (the shortest one) in 1989 is the actual COD load with cleaner production technology and end-of-pipe measures. The two bars in the middle show the estimated loads with different cleaner production processes.

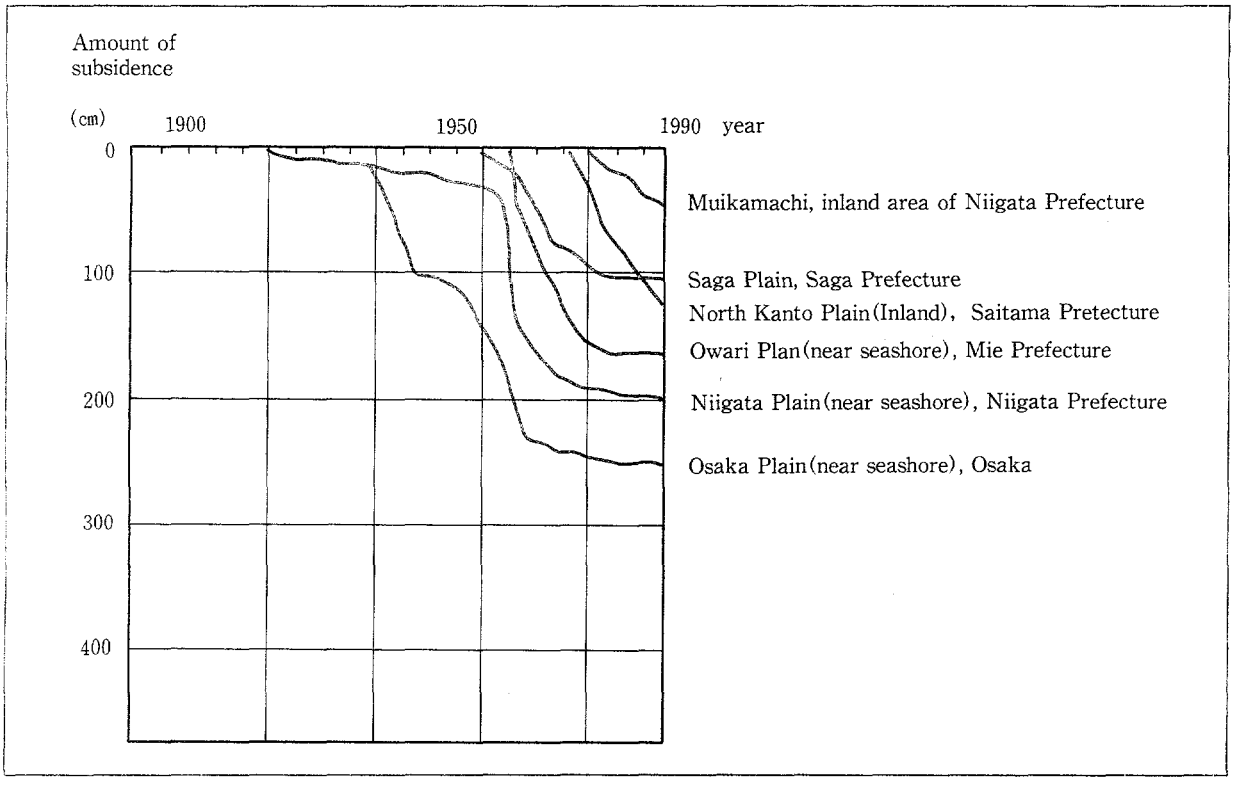
water supply and its disposal for industrial users was made still greater by tightening restrictions on groundwater abstraction. The environmental benefits of such a policy can be illustrated with reference to the impact on land subsidence, and by indicators of the extent to which water recycling has increased in recent years.

The environmental impact of the groundwater legislation was considerable. First, Figure 6.7 shows that land subsidence, a major problem in many parts of Japan, has effectively ceased in many areas. Since industries were increasingly required to purchase water from municipal suppliers, additional capacity was required by water supply authorities, and costs and prices therefore rose. In effect these changes internalized the external costs hitherto imposed by private abstractors on society, so that water prices began to reflect more accurately social costs. By increasing water supply and disposal costs to industry, the legislation also prompted them to engage in recycling on a much larger scale than hitherto, this being illustrated in Figure 6.8.

Organization of Pollution Control Measures in Business Establishments

As noted above, pollution administration in Japan has involved considerable monitoring and guidance on the part of government. In order to implement industrial pollution control

Figure 6.7: Land Subsidence in Certain Areas of Japan (1900-90)



Source: Japan Environment Agency

measures, pollution control systems in factories and business establishments have evolved in parallel with the administrative developments.

In order to assist this process, in collaboration with industrial groups, the national government has introduced the following procedures:

- a notification system by factories/business establishments for specified facilities;
- monitoring of factory operations;
- preparation of systems for data keeping and reporting;
- responsibility system for pollution control by factories/business establishments based on "Law for Development of Pollution Control Organization for Specified Factories " of 1961; and
- training and assignment of engineers in charge of pollution control.

The 1961 Law stipulates that specified factories (those with facilities designated by government ordinances as causing soot and smoke, waste water, noise and vibration over certain limits) have primary responsibility for their own pollution control programs. It also sets out the qualifications that responsible personnel within each enterprise should have. As described in Chapter 4, these include chief engineers in charge of pollution control, other technical staff, and pollution control managers, who are engineers in charge of management and operation of specified facilities, data analysis and other technical matters.

Pollution control managers must have explicit qualifications. Engineering managers should pass the MITI-controlled examination of high level technology and legislation related

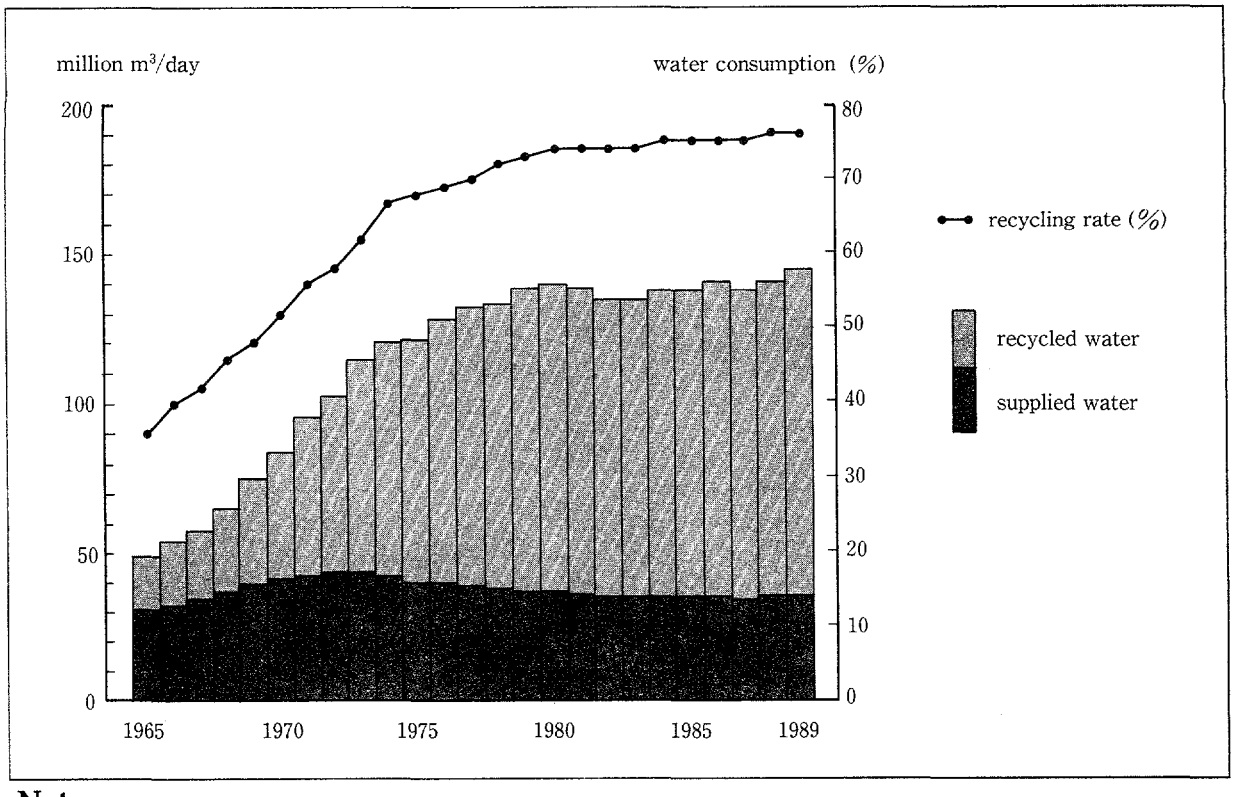


Figure 6.8: Industrial Water Use and Recycling (1965-90)

Source:: Japan Environment Agency

Notes:

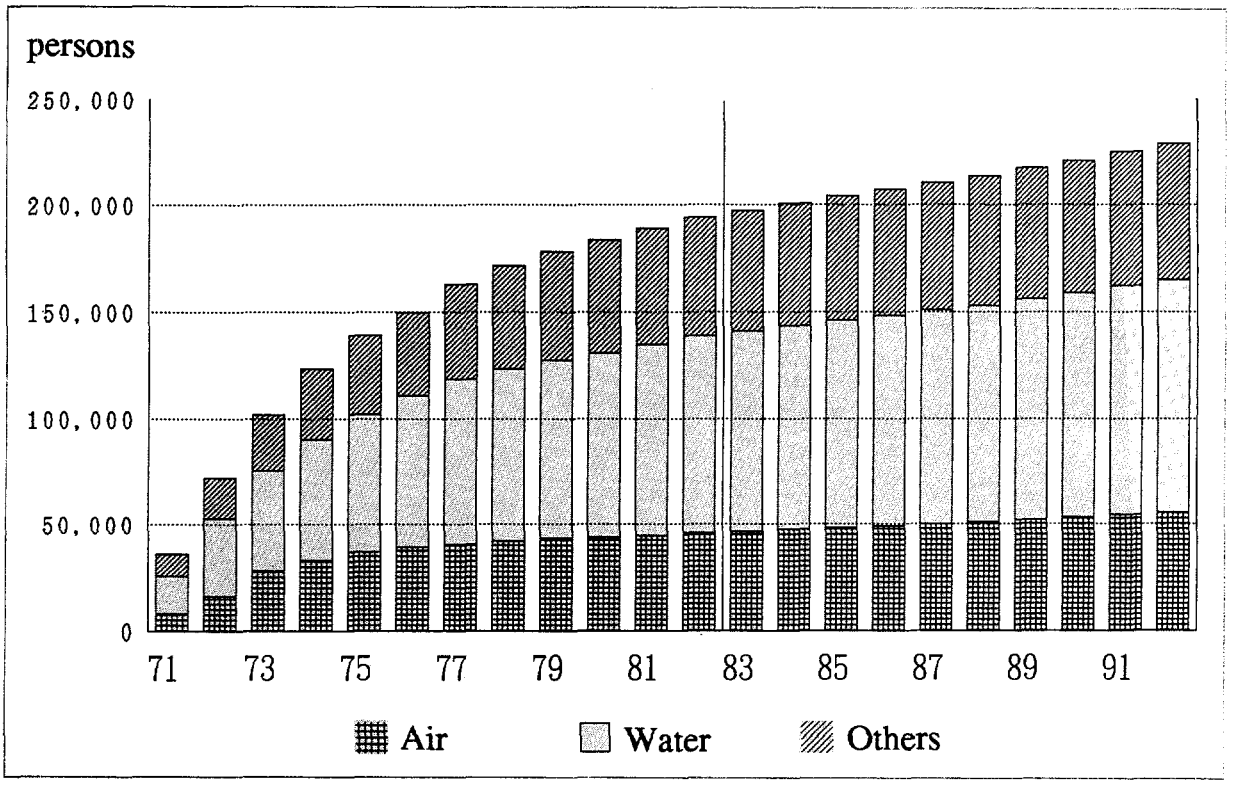
Recycling rate = Recycled water / Water consumption

to environment. As an example, the major subjects of the air pollution examination include relevant legislation, incineration technology and control of smoke and soot, monitoring and measurement technology, technology for treatment of hazardous materials, and technology for removal and collection of particulate matter. Certain facilities cannot be installed and operated without pollution control managers. The increase in the number of qualified pollution control managers between 1971 and 1991 according to specialty (water pollution, air pollution and other) are shown in Figure 6.9. These managers have personal responsibility, which may be subject to legal penalty in case of default, for their specified environmental duties.

Group Decision Making

The decision making structure in the private sector with regard to industrial pollution-as indeed to other strategic issues-takes place at two levels: one at the individual enterprise level and the other at the industrial group level. The group is an association of enterprises which have certain interests in common, i.e., participating in the same trade at the national level, or located in the same geographical area. Such groups have been of considerable importance in bringing about the co-operation of industry in the attainment of environmental objectives. When, in the early 1970s, as a result

Figure 6.9: Qualified Pollution Control Engineers 1971-91



Source: Industrial Pollution Association of Japan

of social and legal pressure, Japanese industrial leaders were forced to take action to improve the environment, industrial associations played a central role by agreeing on the environmental protection measures that their members should take. The economic risk to any particular firm of taking costly measures was therefore reduced, since all member firms agreed to take the same kind of pollution control measures.This arrangement, which continues to day, ensures that investment in pollution control affects firms' competitiveness more or less equally.

The Federation of Economic Organizations represents Japan's business interests, with which are affiliated the nationwide organizations of each industry. The Federation, as industry's representative, negotiates with national and local governments regarding policies that affect them, such as energy, regional development and pollution control measures. The Federation puts together the opinions of its members and presents them to the government. The national organizations of each industry have developed basic measures and technology to cope with pollution under the guidance of the MITI. Decisions as to how far industry should take pollution control measures consider the trend of public opinion, legal sanctions, technical feasibility and costs. Individual industrial groups decide on their own policy recommendations in light of these factors, which vary according to location.

Following deliberations, some enterprises are subjected to strict effluent controls to meet the environmental standards. In the case of industries mainly made up of large companies,

nationwide organizations like the above negotiate with the MITI and others while at the same time coordinating with local governments. This helps avoid cases in which acceptance of strict standards in high pollution areas might otherwise be used as a precedent for the establishment of similar high standards in other parts of the country.

Trade organizations include the Electric Power Industry Association, which consists of the nine power companies which supply electric power throughout Japan, five of which account for 85% of all power supplied in the country. Others are the Japan Steel Association, in which five enterprises which produce two-thirds of all the crude steel take the lead; the Japan Automobile Industry Association, which includes the five enterprises which manufacture most of the vehicles as well as many suppliers of parts; and the Petrochemical Industry Association, which includes a large number of enterprises, many of which are members of this association. Other organizations include the Japan Paper Manufacturing Industry Association and Cement Industry Association.

Chambers of Commerce and Industry whose members are local enterprises are located throughout the country. In medium and small cities, some of the Chambers have specialized staff who can be consulted by local enterprises on pollution-related matters. In cities with a large industrial complexes or zones, Pollution Control Associations comprised of major factories in the region are set up with the assistance of the local governments. The local government and the Association decide on how to set environmental goals for the region, how to achieve them, and also how to request national level support. This system has made it possible for local government bodies to understand the intentions and attitudes of local enterprises. It also permits enterprises to present opinions as a group to the local government; in many cases this would be difficult for individual firms to do.

The associations are also used for training in pollution control technology, exchange of experience, presentation of pollution control measures taken by local governments, and discussion of regulations. The contents of pollution control agreements among members' companies and plans for implementing environmental measures are discussed between members of the associations and local governments. Overall, the associations have contributed a great deal to an effective cooperation between industry and local governments.

Pollution control organizations for most major industries have also been established, some of them having been in existence for many years. These have been engaged in negotiations over pollution control measures with the central government, centering on MITI under its industrial priority policy. For example, in the case of the Japanese Federation of Iron and Steel Industry, the following organizations have been created:

- Committee for Industrial Waste Water in 1954;
- Committee for Countermeasures for Soot and Smoke in 1964;
- Committee for Location and Pollution consisting of four special subcommittees for loca-

tion, air pollution, waste water and waste in 1967;

- Association of Research for NOx Removal Technology in the Iron and Steel Industry in 1973;
- Committee for The Use of Sludge as Resource in 1976; and
- Participation in Committee on Environmental Issues in the International Iron and Steel Institute in 1971 and training for environmental managers in iron/steel industry from developing countries.

Similar measures have been taken in other major industries such as paper and pulp, electricity, petrochemicals, cement, and car manufacturing. However, this can only be done for the largest industries. Small and medium sized industries such as food processing, plating and textiles have taken measures on an individual factory basis, although they have received technical support from their local government pollution bureaus, Japan Environment Corporation, and manufacturers of pollution control equipment.

Voluntary Agreements

As noted in earlier chapters, a unique characteristic of Japan's environmental policy has been the willingness of private industry to enter into agreements with local governments which establish environmental standards significantly higher than those required by national legislation. Obviously, industrial enterprises make decisions about anti-pollution measures based upon financial self-interest. For example, the growth in "green consumerism" both at home and abroad means that pollution control measures are necessary to maintain or strengthen the competitiveness of Japanese industry; i.e., pollution prevention pays.

This self-interest may be defined in terms of a somewhat longer time horizon than would apply in many countries. One reason for this is the political stability in Japan, and the expectation of continuity in the fundamental business environment. Thus, important factors in determining industry's attitude toward investment in environmental measures include a desire to avoid doing anything that will injure the reputation of the enterprise or that will harm relationships with local residents. It is also important, for a variety of reasons unrelated to environment, to keep on good terms with the local administration. This attitude has facilitated the many Pollution Agreements, referred to earlier. In some cases, there is another economic rationale for this attitude; a general expectation that environmental standards will continue to increase suggests that it will in many cases be cheaper to invest in advanced pollution control measures now rather than later.

Indeed, this attitude has been actively encouraged by the Japan Environment Agency, which has introduced a stepwise approach to increasing standards, specifically in order to obtain cooperation of industry. Increases in standards are spread over periods which parallel the length of time necessary for the pollution control equipment to be depreciated. Firms enter agreements because they foresee stepwise regulation taking place according to an agreed schedule, and uncertainty is therefore minimized. This is a feature of a more general business environment in which there is expectation that past trends in government policy

will be maintained in future years. (Until very recently this has been related to continuation in power of the same political party.)

The attitude of industry toward pollution control, therefore, is not entirely altruistic. This is evidenced by another principle followed by industrial enterprises, which is neither to exceed or have lower anti-pollution standards than other firms engaged in the same processes in the same district. The same standard is thought to be appropriate. It can be exceeded only when the company can provide adequate explanation to the other companies, or if the measures can be carried out at a cost that does not substantially exceed the amount that the other companies spend on pollution control. This policy helps to avoid potentially costly competition in pollution control. Moreover, although placing heavy emphasis upon the public relations consequences of appearing to be heavily pro-environment, industries in fact routinely put great pressure on governments to keep the standards as low as possible.

Footnotes:

[12] SMSIs are defined as follows:
Manufacturers - those with paid capital of 100 million yen or less than 300 employees.
Wholesalers - those with paid capital of 30 million yen or less than 100 employees.
Retailers/Services - those with paid capital less than 10 million yen or less than 50 employees.

[13] Source: Economic Monthly Report, S. Ando, Economic Planning Agency, September 1967.

[14] Also see Case Studies.

[15] Source: Gohdo Shuppan, Japanese Pollution Experience, 1991. Original source of the Japan-wide SOx damage estimates: report by Yoichi Kaya to Club of Rome. (Compensation was estimated assuming that (a) SOx concentration would increase at a rate experienced during the 1965-1976 period and (b) compensation would be paid to 15% of people living in major industrial areas of Japan at the same rate paid in 1975.)

[16] In INTEP Newsletter, No.2, June 1993

Future Challenges

As the preceding pages have shown, there has been excellent progress in environmental management in Japan over the last forty years. This is evident from greatly improved air and water quality, as well as in terms of social indicators such as public health. Although the overall record is impressive, the country still faces some major environmental problems. Some of these are inherited from the past, such as soil and water pollution from toxic wastes; these problems are compounded by the continued development of new chemicals, which pose a continual challenge in terms of their safe disposal. Though hazardous waste management legislation was completely amended recently, much has to be done for better implementation of hazardous waste management. Integration of resource use, conservation, recycling, waste minimization, waste treatment and disposal, will have to be further promoted with industrial cooperation to allow development of more efficient and socially acceptable industrial waste management systems.

There are other issues of growing concern in environmental management. They include deterioration of urban air quality along the roadside and destruction of the natural environment particularly along the coastline, both of which resulted from the continuous increase of automobile use. Also, despite its heavy reliance upon extremely expensive incineration as a means of disposing of solid waste — an option that is typically not feasible in a developing country context — Japan faces potentially severe problems in developing suitable sites for landfill; much needs to be done to encourage further recycling.

Growth in Transport While standards relating to individual polluting activities have been systematically raised over recent years, ambient quality has worsened in some important areas due to the increasing scale of economic activity. Total vehicular emissions and transportation noise are clear examples of this phenomenon. Transportation in fact continues to pose severe environmental problems. Despite the country's wealth, and a mass transit operation that is one of the best in the world, the private automobile poses intractable problems for Japanese environmental management. This should be one of the key lessons for the developing countries; given the high costs on public finance and high environmental impacts it is important for them to make every effort to **encourage mass transit at the expense of the private car, at an early stage of car ownership and use.**

Transboundary Problems Although in terms of its achievements in the field of energy efficiency and conservation, Japan is among the world's leaders, the threats from acid rain, global warming, and from the disposal of nuclear waste all require continued efforts in research and development; responsibility for this lies mainly with industrialized countries including Japan. Also, in common with other countries which strictly enforce pollution control legislation, the Japanese government faces the issue of environmental pollution in developing countries resulting from the activities of direct investment by Japanese firms and their

subsidiaries. Aside from the regulatory provisions of the host countries for the firms to observe appropriate discharge standards, the investing countries like Japan need to make every effort to facilitate collaborative institutional mechanisms for dealing with this new kind of transboundary pollution control problem.

Underlying Economic, Social and Cultural Factors

It is clear from Japan's experience that the design and implementation of environmental policy does not exist in a vacuum, but depends heavily upon the interplay between a wide range of factors. In particular, efforts to reconcile the often competing interests of different segments of society, and where possible to achieve a coincidence of interest between different groups is always a major challenge of environmental policy. In the case of Japan, a variety of economic, social and cultural factors-some of them unique to the country-have been highly conducive to the achievement of environmental goals, and do much to explain Japan's success in this area. Recognition of the significance of these underlying factors is necessary to assess the relevance of Japan's experience for other countries, and some of them are described below.

Economic Growth and Industrial Strategy Japan's phenomenal rate of economic growth is of central importance in explaining its ability to invest in expensive pollution control measures. A key characteristic of economic development in Japan has been a rapid rate of technological innovation and modernization of industry. Efficient plants, which avoid wasteful use of resources are typically more environmentally benign than those which employ old fashioned technologies and processes. This process has been hastened in Japan by strenuous efforts to learn from western technology, and to adapt it to the country's specific needs. Indeed, among the major lessons from Japan's experience is that the country has **taken advantage of new industrial processes which are not only economically and financially justified in themselves, but also bring about environmental improvements.** This industrial efficiency and international competition has also been stimulated by water and energy prices (see below).

In these circumstances, **integration of environment into industrial policy** — a key feature of the Japanese experience — has been both affordable and acceptable to the private sector. Determination of national economic policy, including that relating to the environment, depends heavily upon the unique relationship that exists between government and industry, with the Ministry of International Trade and Industry on the one hand and the industrial associations on the other continually working together to find an acceptable balance between social and financial objectives. Economic growth provides the framework within which compensation for damages; increasing industrial emission standards; factory relocation; and large public expenditures on urban solid waste treatment and disposal infrastructure can be introduced with relative ease.

Political and Economic Equality Another critically important factor is the level of informed political debate and freedom of speech that exists in Japan. The level of political

debate in a country is often illustrated by its income distribution; Japan has one of the most equitable income distribution patterns in the world. Environment is typically characterized by conflict of interest. The politically and financially powerful tend to benefit from causing environmental damage at the expense of the poor and disadvantaged, who often have no opportunity to articulate their concerns, and have little hope of government support. In many countries, local protest movements are not effective because of lack of education and awareness of the problems, and inadequate support from the media. These conditions have not seriously existed in Japan in the years following the second world war.

Popular Movements Specific developments in Japan with regard to the articulation of people's concerns for the environment, and the evolution of awareness, include the establishment of democracy after the war and the growing neighborhood protest movements against pollution. Under the occupation policies in Japan, all people secured the right to vote, and farmers became independent after land reform. Freedom of speech encouraged grassroots **protest movements which denounced industry and the government for being slow to take environmental protection measures, and which claimed compensation for damages that had been sustained.** This prompted the government and industry to take a more forward-looking and preventive approach to pollution control.

Education and Awareness Universal education has played a key role in the development of Japan's environmental movement. Japan had already introduced universal education in the early 1900s, and had attained one of the highest average educational levels in the world by the 1950s. The Japanese people began to understand scientific aspects of pollution problems and took great interest in them. Additionally, individual scientists, sociologists, and lawyers provided intellectual and technical support to anti-pollution movements, and this made it increasingly difficult for the government to ignore the growing and well articulated concerns. Freedom of the press introduced in the postwar years, the high standard of literacy, and nationwide environmental campaigns by the mass media have all combined to raise peoples' awareness of pollution problems and contributed greatly to the formation of public opinion with regard to their right to be protected from pollution and to live in a healthy environment.

Traditional Respect for the Natural Environment Until the twentieth century, Japan's key industries had been agriculture, forestry and fishery. Most farmland in existence today was already well established by 1900. Early consolidation of the agricultural production base has contributed to the prevention of damage to the soil and water environment despite subsequent industrialization and urbanization. Sophisticated means of dealing with flood and drought date from ancient times, and afforestation schemes and ecologically sensitive farming practices were associated with high and sustainable productivity, despite a rapidly growing population. Although periodically subordinated to other priorities of the national government, this traditional respect for the natural environment and the economic services it

provides has continued to be a factor influencing the pattern of Japan's development process, even though the nation's economic and industrial structure has changed dramatically.

The Impact of Social Pressure on Industrial Behavior An almost uniquely Japanese characteristic is the widespread **concern on the part of both individuals and enterprises that they should not be subjected to public criticism for anti-social behavior, in particular**, in their local community or region. Since environmental problems are largely of this nature — i.e., they involve damage caused by one party to others — this concern is an important factor in explaining why there has been a good record of compliance with environmental regulations and policies. It also helps to explain the existence and effectiveness of voluntary Pollution Control Agreements. Once a governmental policy is made public, Japanese enterprises tend to be extremely conscientious in carrying it out, for the reason indicated above. However, this also means that they make exceptional efforts to influence the policy in advance; policies which emerge therefore tend to represent consensus between government and industry, and therefore have a greater chance of being successful in practice.[17] Another result is the amount of time needed for consensus building.

Roles of National and Local Government The national government traditionally establishes the overall legislative and regulatory framework for all domestic policies, provides financial assistance to local governments and the private sector, and assists in technology development. The mechanism of financial assistance to local governments has in practice been highly effective in furthering national policy. Local administration in Japan has for many years depended heavily upon a financing system in which the **national government provides funds to compensate for local variations in revenue-raising ability**. This system along with a decentralization of power has played a major role in making local government measures effective.

National-local government relations with regard to environment follow the conventional pattern, with **actual implementation of pollution control, including establishment of local standards, regional pollution control plans, monitoring and enforcement being entrusted to local governments**. These relations have been confirmed by the Basic Environmental Law of 1993 which requires each local government to draw up an environmental policy operational directive of its own This is an essential element of the overall policy, for local governments are on the "front line" when it comes to dealing with specific environmental incidents.

The success of Japan's pollution control strategy rests heavily upon the competence and status of local government officials, which in Japan is by tradition extremely high. Indeed, while formal mechanisms suggest that the national government takes the lead in the development of strategic policies, local governments have historically been in the vanguard of environmental policy reform in Japan. Heads of local governments, as they are elected by local people, were extremely sensitive to the attitudes of local people, and the national government cannot morally oppose them, because

historically they have taken the lead in the pollution control field.

Sectoral Policies Combined with the foregoing are a number of policies that have been developed in individual sectors, many of them having important consequences for the environment. Foremost among these is energy policy, characterized in recent years by heavy emphasis upon efficiency and conservation, and encouraged by governmental provision of technical and financial assistance, and by a pricing policy designed to discourage excessive and wasteful use of energy. Similar considerations apply to water supply policy. MITI's policies of promoting self-control by individual enterprises through requiring employment of well-qualified pollution control engineers is another aspect of Japanese experience which could be taken up by developing countries. In the transportation sector, mass transit policies are also consistent with sound environmental management. Other sectoral policies related to agriculture, water resources, transportation, and urban and regional development also have a profound impact upon the environment. These impacts are often beneficial, but not always; for example, land reclamation and multi-purpose river basin projects have in many cases been effective in pollution control, but have destroyed natural shorelines and the ecology of rivers.

Relevance of Japanese Experience for Developing Countries[18]

Grow Now, Clean Up Later? Japan's economic development strategy in the immediate post-war years gave absolute priority to industrial growth, with little regard for its environmental consequences. Only in the latter years has environment been accorded a significant priority, and this after considerable community pressure and, for different reasons, a rapid rise in energy and water prices. This experience does not answer the question as to whether developing countries should follow a similar "grow now, clean up later" strategy. Clearly, one of the reasons why Japan followed this path was that there was inadequate awareness in the early years of the extent to which environmental degradation in fact threatened economic development. Moreover, in the intervening years, much has been learned, not least from Japan itself, about the many **policy reforms and investment strategies that satisfy both economic and environmental objectives**. Pollution control technologies have also improved, and their costs have fallen. In particular, reliance upon "end-of-pipe" treatment has been superseded in recent years by much more cost-effective measures involving modernization of industrial processes.

Certainly, Japanese experience in many cases confirms that prevention is indeed better than cure, and it provides many examples, highly relevant for developing countries, in which the policy of placing growth before environment would be incorrect even in narrow economic or financial terms. There remain, however, many areas in which there are significant trade-offs between environmental management and other economic and social objectives; each of these will have to be determined on a case-by-case basis. Clearly, developing the capacity and incentives in both government and industry to carry out envi-

ronmental impact assessments of major projects or policies is an essential step, as is the need to improve monitoring of ambient water and air quality and of effluents, emissions and wastes.

Phasing Implementation Japan's recent environmental history provides a number of lessons that are relevant for developing countries. Even though some of the major concerns in Japan might not be of the highest priority in developing countries (e.g. air quality improvements may appear at the present time to be of secondary importance compared to urban sanitation), issues relating to organization and management; achieving the co-operation of various interests; financing mechanisms, and reconciliation with economic objectives are common to many forms of environmental degradation. In considering the relevance of Japanese experience in specific policy areas, one may identify those aspects which provide lessons that can be implemented in the very near term; those which may be introduced in the medium term, say in five to ten years; and those which are very long term, or perhaps not even feasible to consider.

Institutional Reform Some aspects of Japan's recent environmental history could be of immediate application; of highest priority for developing countries are those examples of policies which have involved no trade-offs between economic development and environmental protection. Many of these relate to institutional reform. For example, a major priority for developing countries should be to develop the capacity of local authorities since they have the most immediate responsibility for day to day environmental management.

In most developing countries, improvement of urban sanitation is one of the most urgent issues to be resolved. Therefore, it will be most efficient if institutional and manpower development are carried out simultaneously with the execution of urban sanitation projects such as water supply, human waste and solid waste management. In the short term, if there is inadequate capacity for industrial pollution control at the local level, the lead must be taken by the central government, which should support local authorities with finance, training and institutional development, and by giving them legal powers for on-the-spot inspections and to enforce legal penalties for non-compliance with environmental laws.

Japan has found that non-governmental support mechanisms are indispensable for effective environmental management. This will be even more so where government agencies are relatively weak, as in most developing countries. Examples of such support, which should be encouraged in developing countries, include **voluntary pollution control agreements between industry and local governments, and the establishment of pollution grievance machinery and pollution abatement associations jointly organized by private industry and local governments.**

Industrial Self-Reliance Developing the ability of industry to be self-reliant in pollution control technology development and abatement is also required. In Japan, **installation of qualified personnel in industry with specific responsibilities for pollution control has been of extreme importance, and is one of the most significant lessons of Japanese experience for**

developing countries. Joint implementation of pollution abatement measures by major industrial firms and the role of industrial associations in providing technical guidance on pollution abatement for small and medium industries has also been important. Additionally, in developing countries, there are often multinational corporations which have much experience in pollution abatement, and whose expertise should be used to disseminate advanced pollution control technologies.

Establishment of a partnership between the public and private sectors has also been shown in Japan to be essential if pollution abatement is to be reconciled with economic growth objectives. **Industrial pollution abatement measures in Japan have always been based upon detailed discussion between industry groups and the government.** Developing countries should make every effort to establish mechanisms for such dialogue to take place in an informed and co-operative manner.

Industrial Process Change A number of immediately transferable lessons relate to pollution control technology. In Japan, early pollution control efforts were primarily "end-of-pipe", but there has been a consistent shift toward reliance upon industrial process changes, which are much more cost-effective and consistent with the twin objectives of economic growth and environmental protection. Japanese experience suggests that there are many opportunities for developing countries to introduce economically and financially viable process technologies that also have positive environmental impacts, and which should therefore be given priority.

Promoting Pollution Control Most developing countries will have a shortage of pollution control technology expertise for the foreseeable future. Central governments can usefully provide a support system to local governments and the private sector by promotion of a pollution control industry and consulting services as well as the establishment of technical assistance bodies. The experience of the Japan Environment Corporation, which has played a leading role in disseminating technologies as well as providing financial assistance, is of relevance here. The institutions of higher education like universities and professional engineering schools in Japan have also successfully produced a large number of qualified engineers in the field of pollution control. Also, to help pollution control personnel to enhance career prospects, the governmental and semi-governmental institutions in public health and environmental management provide occasional short courses and training programs on, for example, new environmental legislation and for them to obtain national and local professional qualifications.

Low Cost Technology Japan has accumulated extensive experience, of great relevance to developing countries, with low cost, traditional technologies, and demonstrated that they can provide a high standard of service if properly managed. A night soil collection system similar to the Japanese system may be usefully considered for certain urban areas in developing countries, as long as the treatment of collected night soil can be managed at a reasonable cost. The on-site treatment system called Joukasou (septic tanks treating both night soil and domestic waste water) may also be appropriate for use

under certain conditions in developing countries, as long as appropriate modifications are made to the design of the system to minimize energy requirements and more importantly an appropriate institutional/legislative mechanism for maintenance is established.

Clean and Profitable Production At the other extreme, Japan is also one of the world's leaders in integrating environmental objectives into industrial processes, by using what has come to be known as clean production methods. It has been shown that highly sophisticated modern technologies may not simply be cost-effective in reducing pollution, but also highly profitable. Developing countries should therefore carefully assess environmental technologies in terms of their economic justification, and the appropriate solution might be either traditional and labor-intensive, or modern high-technology.

Other specific technical aspects of Japan's experience, including efforts to overcome past failures, are also relevant for developing countries. These include industrial and public sector training methods; energy conservation and efficiency technologies; waste recycling, composting, incineration and heat recovery techniques; experience with sanitary landfill; hazardous waste management; procedures and techniques for monitoring and testing; use of planned estates for industrial relocation and the achievement of economies of scale in joint waste treatment facilities; land reclamation; epidemiological studies; setting environmental standards, including linking the staging of standards with the depreciation period of pollution control equipment; and river basin, land use and regional environmental planning.

Financing Pollution Control Japan's experience with regard to financing pollution control is also of relevance to the developing countries. Pollution control efforts in Japan have clearly been hastened by the provision of low interest government loans and tax incentives for private industry, mainly for medium and small scale industries. Extensive low interest financing has also been supplied by the central government to local governments for the financing of water supply and sewerage schemes and solid waste management, with the central government contribution being tailored according to local ability to pay. Financial support of this kind is generally recognized to have been one of the most important policy tools in Japan. They have been highly effective in the Japanese context, and, subject to the reservations expressed below, should be carefully considered by developing countries.

Energy price reform is one of the best examples of policies that meet both environmental and economic objectives. **Raising prices of energy to reflect economic costs of supply has discouraged excessive use in Japan, and has stimulated conservation and technological innovation. Underpriced energy is common in developing countries, and reform in this area should be given extremely high priority**; higher prices would also raise revenues to enable the utility authorities to provide more effective operation and maintenance as well as system expansion. Similarly, experience in Japan has shown that raising water and sewerage charges, particularly when combined with restrictions on private abstraction of water by industry, has been most beneficial in terms of encouraging

more efficient water use, recycling, and reduction in ground subsidence. There is also much scope for reform in this area in most developing countries. Other measures, which Japan has not employed, could also be relevant for developing countries. These include presumptive charges on industry depending on their calculated pollution load, the charge being reduced if the individual industry can prove a lower rate of emissions.

Environmental Awareness There are a number of other lessons from Japanese experience that might usefully be considered by the developing countries. These include promotion of environmental education and public relations to improve awareness about environment; this should include increased emphasis on health education and the use of health specialists in pollution control policy at an early stage of pollution control, when there is a lack of a sufficient number of environmental planners/engineers. **The mass media in Japan has been a major influence in alerting people to the importance and potential hazards of environmental degradation, and the presence of a well informed population has been a major contributor to the improvement of the environment in the country.**

Development of support systems for those who have suffered as a result of environmental pollution should also be considered; involvement of those with scientific and legal expertise should be developed by the establishment of formal machinery for the redress of grievances. The importance of scientific monitoring of ambient air and water quality as well as point-source and distributed emissions is critical to establish a verifiable basis for compliance.

Public Participation Perhaps most important of all the lessons to be obtained from the Japanese experience is that public participation is indispensable to satisfactory resolution of environmental problems. This was demonstrated in the early years when citizens' movements — not formal non-governmental organizations, but spontaneous reactions to specific events — were the prime driving force underlying the rapid development of Japan's environmental policy. The government, recognizing this, now provides **the opportunity for those who are or will be personally affected by environmental pollution or control measures to participate formally in the decision making process**; this is exemplified by the important role of public hearings in environmental impact assessment procedures at both the national and local levels. Even in Japan, however, there is often inadequate representation of those citizens who will be most directly and personally affected by proposed large scale development projects.

Limits on Transferability It may not be possible to immediately implement some of the other successful measures in many other countries. Indeed, some of the most important ones, as noted above, are either of a cultural nature, or relate primarily to the country's ability to carry out certain actions (such as the use of highly expensive incineration) because of its high per capita income. By definition, progress which depends upon these factors is not easily transferable between countries, in particular those in the developing world. Nevertheless, steps might be taken to move in the direction suggested by Japanese experience. For example, it has been noted that it is essential to build up

local government capacity sufficient to take a leadership role in environmental management. This will obviously involve considerable administrative and training needs, as well as substantial financial requirements, and is clearly not a short term undertaking. Similarly, strengthening the technical and financial linkages between national and local governments — a key aspect of Japan's environmental policy — is not something that can be accomplished rapidly.

Economic Valuation It is important to note that there are some ways in which Japan's policy and attitude toward environment, while highly successful in Japan itself, should probably not be imitated by other countries. One of these relates to the valuation of environmental protection. The importance of public pressure in stimulating governmental action has been a consistent theme in the evolution of Japan's environmental policy in recent years. **Decisions to introduce environmental regulations and standards, which typically imply massive public and private expenditures, have been made largely as a reaction to political realities, or as an immediate response to accidents, in other words, only through consideration of health impacts.** They have typically been made on a pragmatic, common sense, basis; if the benefits likely to result from such expenditures are estimated at all, it is done solely in physical terms, such as improvement in air or water quality.

Measurement of benefits in economic terms to justify environmental policies or projects in an explicit manner is rarely done at the national or city level prior to decision making. In the past, the obvious social consequences of pollution in Japan may have justified this approach, and there have obviously been important cases in which economic and environmental projects and policies are consistent with each other. However, improvements in environmental quality tend to increase exponentially in cost as standards rise, while the benefits of additional improvements tend to decline. Although precise estimates of the economic benefits of pollution control are not possible, use of a cost-benefit framework will become of increasing relevance to Japan in the future. **Certainly developing countries do not have the luxury to neglect careful comparison of the costs and benefits of environmental expenditures, and should be as rigorous as possible in this respect.**

Enterprise Level Subsidies Another area in which Japan's experience should receive careful scrutiny in a developing country context is with regard to the financing of environmental measures at the enterprise level. The "polluter pays" principle is frequently referred to in Japan, but, as noted above, there are in fact many ways in which subsidies are provided to enterprises to invest in pollution control. These have a number of potential drawbacks; first, they are administratively cumbersome and place great demands upon the government machinery to avoid abuses; second they place a burden on the government's fiscal capacity; third, they may encourage inefficiency in the use of resources at the enterprise level; and fourth, it may be claimed that they are unfair, that the polluter should in fact pay the full cost of damage caused or for remedial measures.

Clearly, however, in Japan such subsidies have provided the financial support necessary *for many small and medium scale industrial* operations, which have been the main beneficiaries, to invest adequately in pollution control. This assistance has also facilitated a cooperative partnership between industry and government in environmental matters, the costs involved being considered justified in terms of the beneficial public health impacts of such a policy. Moreover, helped by the unique government-industry relationship that prevails in the country, Japan has developed the administrative capacity to manage such a system, and its efficiency and fairness can only be judged in light of its relationship to the whole complex web of subsidies and taxes that characterize the Japanese policy of promoting industrial growth. It can also probably bear the fiscal burden of the subsidy system. It may be argued on the other hand, that none of these factors prevail in most countries, certainly the developing countries, where the "polluter pays" principle should reign in fact. Nevertheless, **if the necessary safeguards can be developed, subsidies to industry for investment in pollution control should not be ruled out. Any subsidies in developing countries should probably focus on achieving a more cost-effective approach to pollution control, especially by small- and medium-scale enterprises which are less able to afford individual treatment facilities.**

Assistance to Developing Countries

This review suggests some areas in which Japan can play a more active role in providing assistance to developing countries. It already provides considerable financial assistance for specific environmental objectives, such as investments in monitoring technology and pollution control technologies in industrial firms and municipalities, this effort having increased significantly in recent years. In this regard, its role is similar to that played by the national government vis-a-vis local governments and industry in Japan itself.

Financial Administration Based upon this experience, a specific area in which Japan could provide technical assistance is in the financial administration of environmental pollution control programs. For example, while, as already observed, subsidy programs are difficult to implement, they may be a necessary means of achieving industrial co-operation in pollution control efforts. Japanese experience in identifying the necessary conditions under which such a system would be workable in a particular developing country context could be very useful.

Technology Transfer Japan obviously has a most important contribution to make with regard to technology transfer. Two basic types of technology may be identified. The first relates to **the integration of pollution control into modern production processes**, the second being **the use of low cost technologies for exhaust gas and waste water treatment**. However, as one observer has pointed out, the successful transfer of experience does not simply involve the adoption of isolated pieces of externally developed technology or policy instruments.[19] (Indeed, some of the major unresolved environmental problems in Japan — such as urban traffic pollution and solid waste disposal — may be

explained in part by an undue reliance upon technology-based solutions. Rather, it means the enhanced social capability to absorb, implement, and build upon the transferred experience. Appropriately trained manpower is a necessary, although a far from sufficient condition for this to be achieved.

Capacity Building In fact, a serious obstacle to rapid adoption of modern pollution control processes in developing countries is the shortage of technically qualified manpower to implement the new technologies. Thus, while technical assistance for specific environmental projects or problems can be provided quite easily, this does not have much of an impact on environmental problems that exist on a widespread scale throughout the developing world. This requires a much more forward looking, longer term approach. **Japan's relative success in dealing with its environmental problems owes much to the existence of a large, highly educated, technologically advanced population, who, while they had not been trained specifically for pollution control, were readily able to adapt their training to these new needs.** In general, this does not apply in the developing countries, and remedying this situation is necessary groundwork for development of long term environmental policy.

In order to form the basis for substantial improvement in environmental management in those countries in the next ten to fifteen years, Japan and other donor countries could therefore make an important contribution by providing assistance, not simply for specific environmental activities, but for technical and managerial education in general. This would facilitate a flexible response to as yet unknown technical challenges in environmental and other areas in future years. Such assistance, justified in its own right, would clearly fall within the "no regrets" category of environmental interventions, i.e., being justified not simply in terms of environmental objectives, but also of more general development requirements.

Footnotes:

[17] It should be noted that effective action is taken where responsibility can be clearly established. However, there appears to be a less than enthusiastic commitment to environmental improvement where responsibilities are ambiguous.

[18] Views expressed by developing country participants in the Conference on Urban Management in Asia (Kitakyushu, October 1993), were extremely useful in completing this section

[19] Masahisa Nakamura, "Transferability of the Japanese Experience in Urban Environmental Management", paper presented at Kitakyushu Conference on Urban Environmental Management in Asia, October 1993.

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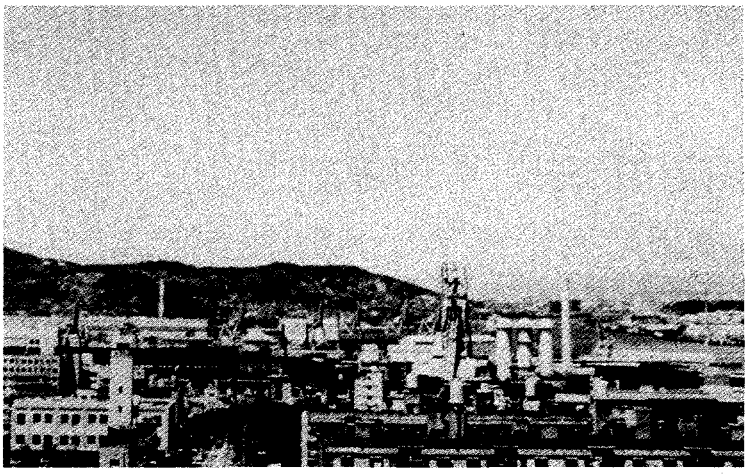
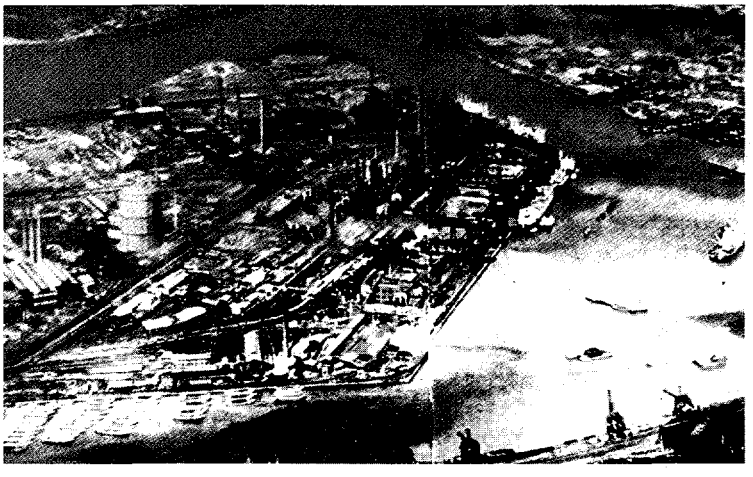
Note:

[1] This document is referred to as Case Studies in the following text.

KITAKYUSHU



1. Dokai Bay in the late 1960s: biologically dead sea polluted by heavy metals, offensive odor, etc. 98% of discharge came from large scale factories.



2. Dokai Bay at present: most industrial processes have been changed.

3. Heavy smoke in late 1960s: Seven colors of smoke, once considered as a symbol of economic growth.

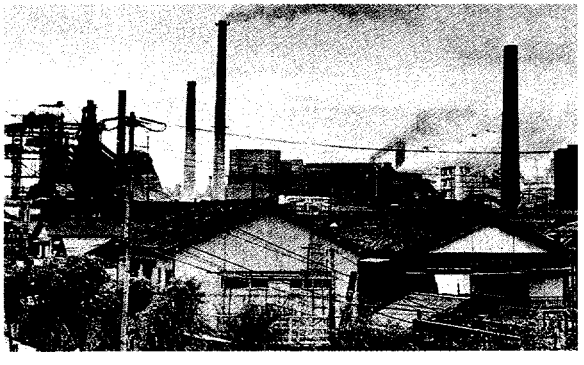
4. Present sky situation.

12. Smog around industrial zone in 1953.

13. Keihin Industrial Zone in the late 1960s.

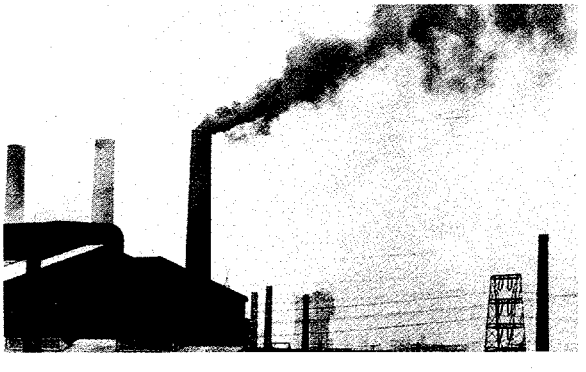
14. Keihin Industrial Zone in 1970: the sky and river are darkened by pollution.

YOKOHAMA

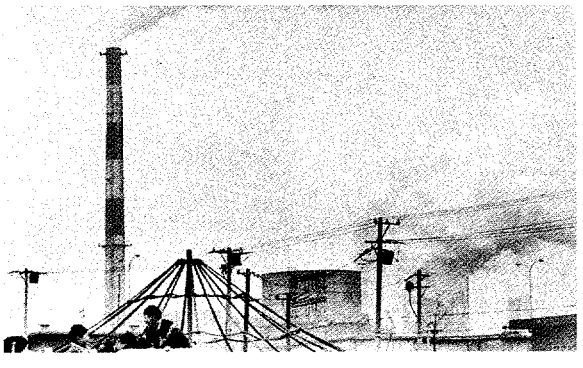


15. Kawasaki in 1970: Black smoke which prompted widespread complaints from the local people.

16. Tsurumi in 1970: Black smoke.



17. Children playing under the black skies (1970).

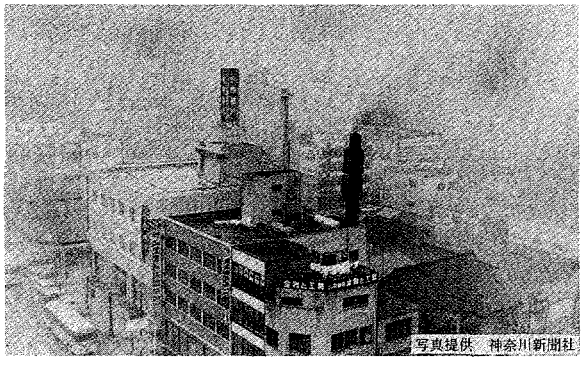


18. Child suffering from asthma (1969).

19. Black smoke in 1971.

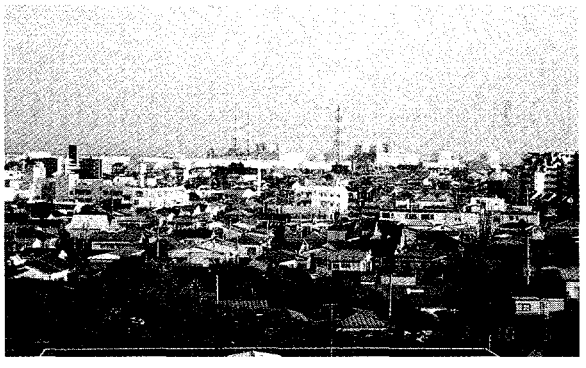
20. Explanatory meeting of new factory location with residents in 1972.

21. Local people covering mouth with handkerchief to prevent vehicular emission inhalation (1970)



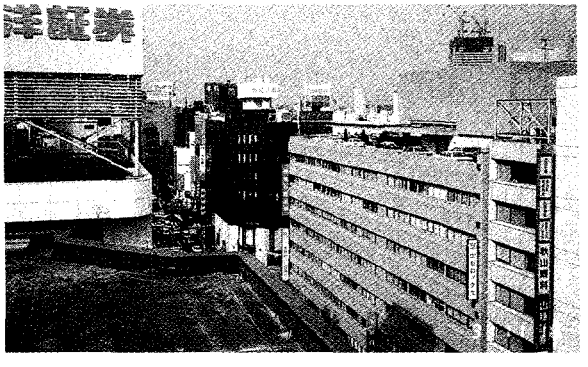
22. Center of Yokohama (11:00 a.m., 1966)

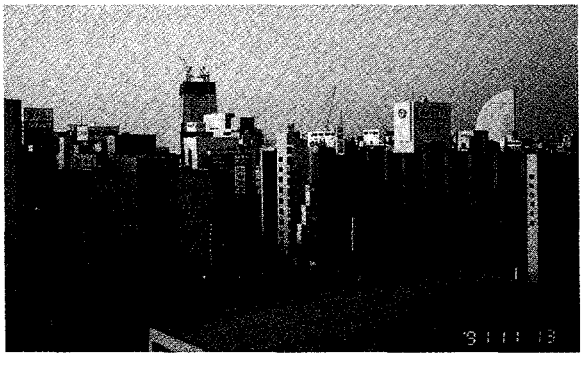
23. Center of Yokohama (1964)



25. Power plant at present: no smoke.

24. Same site as above (present)

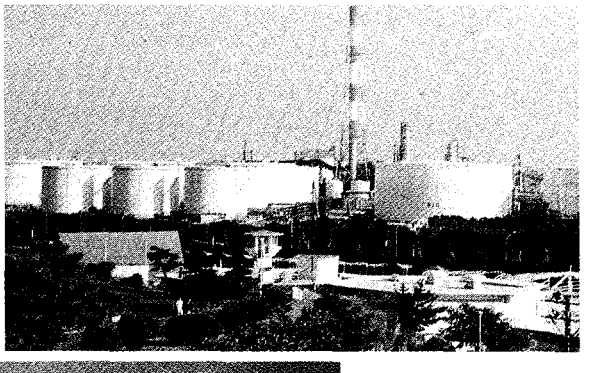


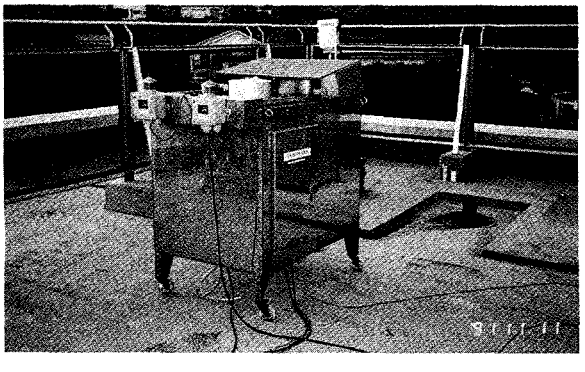


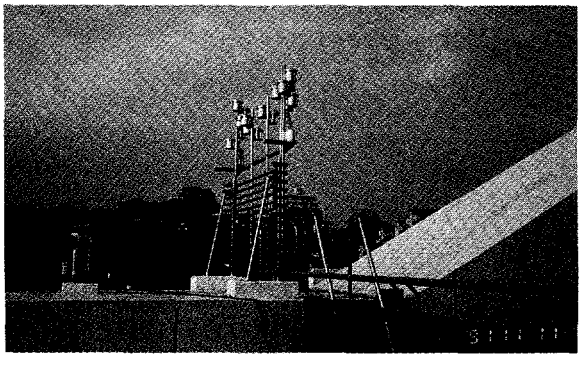
26. Center of Yokohama at present.

28. Industrial zone at present: LNG power plant.

27. Bay Bridge at present.







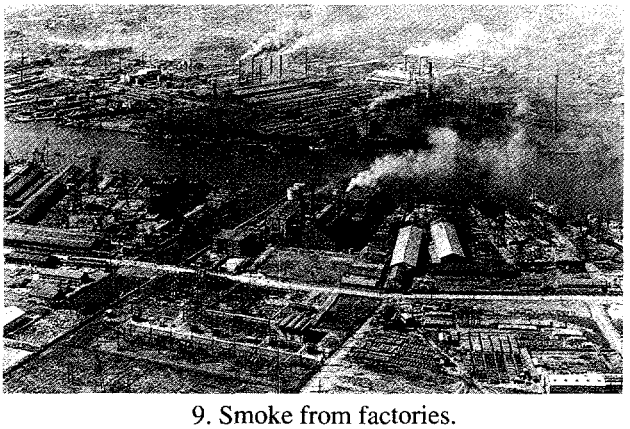
29. and 30. Simplified air pollution monitoring in use at present.

OSAKA

5. and 6. Osaka Castle surrounded by polluted smoke in the early 1960s.

KIZUGAWA COASTAL INDUSTRIAL ZONE AROUND 1960

7. Modest pollution.

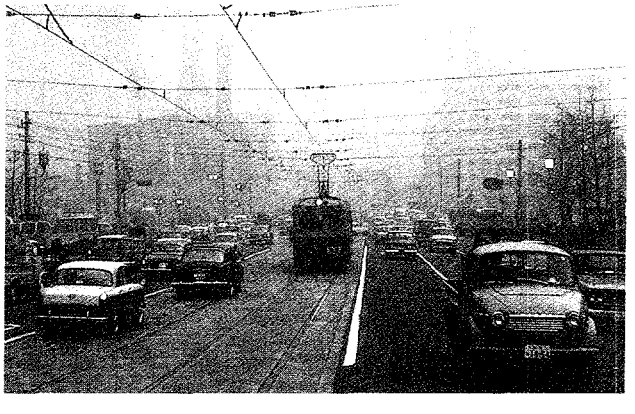


8. Factory smokestacks.

9. Smoke from factories.

10. Inversion.

11. Smog in Mido-suji Street in February 1963: at 10:00 a.m.



Annex Directory:

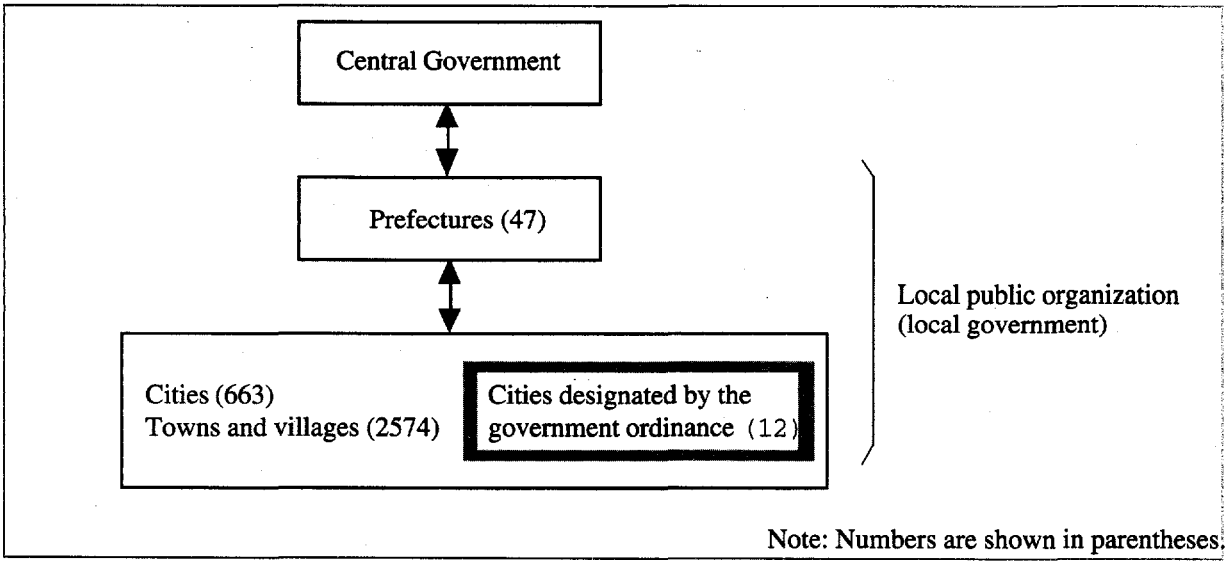
Annex 1: Summary of Case Studies

The MEIP (Metropolitan Environmental Improvement Program) is intended to review urban and industrial pollution prevention measures in Japan, drawing upon the experience illustrated by three city case studies. The three cities concerned are: Yokohama, Osaka and Kitakyushu. The following description focuses on the laws and regulations, measures to attract industry, actions taken by industry and roles played by local inhabitants in these cities, and city's example analyzes the factors leading to successful pollution control measures in these cities.

Overview of Large Cities in Japan and Status of Three Subject Cities

Government organization in Japan is composed of a triple structure, with governments operating at the national, prefectural and municipal levels. Measures determined according to central Government policies are implemented through this triple structure. Various powers, authorities and licensing rights are held by the central Government, prefectures and municipalities, depending on their characteristics.

Unlike the general municipalities, large cities have a special autonomous system. Such cities each have a population of more than half a million and are designated by the government ordinance under Local Government Law. At present 12 cities are entitled to this status. (They are actually treated as having a population of one million.) The three cities in the present case study, Yokohama, Osaka and Kitakyushu, are special cities designated by the government ordinance. This system was established in 1958. Unlike small and medium cities, large cities have special problems unique to the large cities; therefore, they should be administered under a special system. Based on this concept, the administrative duties and responsibilities closely related to daily lives of the citizens have been transferred from the jurisdiction of the prefectural governments to that of the designated cities. For example, welfare,



sanitation and urban planning have been transferred to the jurisdiction of the special designated cities, and the administrative authority of the special designated cities has been expanded to cover areas which used to require approval and authorization of the prefectural government. The same duties and responsibilities as those of the prefectural governments can be said to have been awarded to the special designated cities.

The special designated cities can be classified according to the characteristics as follows:

- Central cities within a large city area (Osaka and Nagoya);
- Cities within a large city area (Yokohama, Nagasaki, Kyoto and Kobe); and
- Local central cities (Sapporo, Sendai, Hiroshima, Fukuoka and Kitakyushu)

They are classified into three categories as given above. The cities selected for the case studies correspond to these categories.

Characteristics of The Three Cities in Environmental and Pollution Control Measures

Local public organizations, especially the large cities, have played a major role in the field of environmental and pollution control measures in Japan. In the latter half of the 1950s and thereafter when the problems of industrial pollution, mainly those of air pollution, came to the surface, responsibility for controlling pollution belonged to the national government or prefectures according to the laws and prefectural ordinances. However, pollution preventive measures had little actual effect, and effective measures were not taken.

In those days, municipalities had no power to control pollution. However, Japan was entering a period of high economic growth, and, to protect the health and living environment of the citizens, voluntary measures were taken against rapidly deterioration industrial pollution problems. As a result, the local public organizations centering on the large cities, based on a good understanding of actual conditions of the local areas, launched various voluntary measures such as establishment of the pollution prevention law, conclusion of pollution control agreements, administrative guidance based on scientific grounds, and review of policies to attract industrial enterprises. These were supported by the consensus of inhabitants and general anti-pollution sentiments. Pollution control efforts led by local public organizations were taken over by the

Cities	Characteristics	Population	Population density (head/km^2)	Shipment of industrial products (1 billion yen)	Number of factories		
					Total number	By number of employees	
						10 or less	300 or more
Yokohama	Cities within large city area	3,233,127	7,434	6,314	6,242 (100%)	3,480 (55.8%)	76 (1.2%)
Osaka	Central cities within a large city area	2,506,368	11,370	7,910	18,560 (100%)	11,874 (64.0%)	73 (0.4%)
Kitakyushu	Local central cities	1,016,232	2,107	2,510	1,941 (100%)	953 (49.1%)	33 (1.7%)

establishment of the Basic Law in the latter half of the 1960s, and gave a major impact to preparation and systematization of related legislation.

At present, the prefectural government has, in principle, the authority to restrict the discharge of pollutants and to conduct the on-site inspection of premises from which pollutants are discharged under the Water Pollution Control Law, Air Pollution Control Law and Waste Disposal Law. Special designated cities have been vested with the same power since 1971.

The following describes the overview of the environmental and pollution control measures taken in the three subject cities of this case study.

Yokohama

Summary of Environmental Protection Measures in Yokohama The City of Yokohama had been a center of trade in Japan from the opening of the port in 1859 through World War II, and an essential part of the Keihin Industrial Area. During the post-war period, however, the city was taken over by U.S. occupation forces, and financial difficulties were severe. Since the city's reputation as a center of trade was ruined, major industries in commerce, trade, and finance had left the city for other areas, primarily Tokyo. In 1951 the city introduced a new strategy, which promoted industrial development through projects such as the industrial zones in reclaimed coastal areas, investment in infrastructure, and methods to attract new factories to the area.

The population of Yokohama was 620,000 immediately after WWII. By the first half of the 1950s, the city's population, at more than a million, exceeded the pre-war level. The downtown area developed in an unplanned manner, and reconstruction of the old coastal industrial area of the pre-war period was the means of facilitating industrial and economic revitalization. In the late 1950s, Japan embarked upon its period of rapid economic growth. Concentration of population and industry in Tokyo converted Yokohama into a dormitory town for Tokyo. The population of Yokohama increased by 100,000 per annum in the period after 1960. The rapid increase in population and industrial activities caused an expansion of the urban district, and haphazard land use. It led to a "doughnut" phenomenon in the downtown area, and suburban sprawl. Results included industrial pollution, and shortages in public facilities, such as schools, hospitals, and sewerage.

In the mid-1960s, about 90 percent of SOx (a major element of air pollution) in the city was discharged from large factories in the existing coastal industrial area. Furthermore, it was at that time predicted that large factories in the new coastal industrial area would discharge the same volume of SOx as in the existing coastal industrial area. However, not having authority to control pollution directly, the City of Yokohama only conducted SOx monitoring, and dealt with grievances on a case by case basis.

Under these circumstances, in 1963, the Asukata municipal administration came into power, with campaign pledges to improve the quality of life of the citizenry, and to enlist citizens' participation in city government. It largely modified the old policy of Yokohama, which had given major priority to creation of industrial

infrastructure. With respect to pollution control measures, the city's own pollution control agreements, which later came to be called the "Yokohama style", prevented pollution in the new industrial area, and controlled pollution in the existing industrial area. Municipal governments had no legal authority over pollution control at the time. Under the agreements, the City of Yokohama obtained, based on mutual consultation, pledges from business enterprises to implement pollution control measures. Pollution control agreements were also adopted in the existing industrial area. Since the latter half of 1970s, the guidelines were also used to generalize the environmental pollution control agreements.

Strict controls enforced for large-scale companies under the environmental pollution control agreements were effective since these companies possessed enough technological and economic capacity to respond to the measures. On the other hand, measures applied to small- and medium-sized factories, which were scattered throughout the city, were difficult to enforce, and their implementation lagged behind. Therefore, during the 1980s, Yokohama started to relocate these factories to the Kanazawa Industrial Complex. Taking advantage of factory relocation, the city was able to control pollution; rehabilitated and modernized the downtown area, and rationalized management of the factories by promoting collective and cooperative actions, and strengthening managerial capacity.

In order to control industrial pollution during the high economic growth period, the city took a series of measures such as the environmental pollution control agreements, various guidelines, and relocation and cooperative actions with small and medium-sized factories. These measures were successful and largely improved conventional industrial pollution.

However, from the 1980s, the focus shifted from industrial pollution to the newer issues of pollution related to daily urban living such as that caused by automobile traffic, domestic waste water, and neighborhood noise. Yokohama recognized that it was time to shift its emphasis from exclusive concern with industrial pollution, and that it was necessary to establish the "Yokohama Environmental Basic Charter" in order to protect and create a good city environment. The city designed the environmental management plan (Environmental Plan 21) in 1986 to realize the Basic Charter. It was recognized that it was necessary not only to control industrial pollution as in the past, but also to implement a comprehensive and well-planned environmental administration for pollution prevention and protection. This plan became the foundation of the new environmental administration.

Based on the environmental management plan, Yokohama has recently handled various environmental problems such as environmental pollution by chemical substances, ecological degradation, large resource/energy consumption, waste disposal, global warming, and ozone destruction.

Evaluation of Environmental Protection Measures in Yokohama

Pollution Control Agreements

Overall evaluation The first pollution control

agreements in Yokohama were conceived by an autonomous effort of the city during the mid-1960s when local governments did not have any legal authority over pollution control. Under the agreements, the city obtained, based on mutual consultation, pledges from business enterprises to implement pollution control measures. The city took the initiative in undertaking preventive pollution control measures with the support of citizens' movements, while allowing companies to establish their factories on a selected basis. The Yokohama pollution control agreement was different from the following two types of pollution control measures, one taken in Yokkaichi and the other in Mishima-Numazu. In the case of Yokkaichi, pollution control measures were pursued only after companies had established their factories and started causing pollution. In the case of Mishima-Numazu, the residents rejected the siting of planned plants by organizing a strong residents' movement. For this reason the Yokohama Pollution Control Agreement was frequently called "Yokohama style". The initiative taken by the Mayor of Yokohama was the main reason for the inception and success of the "Yokohama style" pollution control agreement, which was necessary to protect citizens' health and the living environment. This was a major break with tradition, for according to conventional ideas, local municipalities were not allowed to establish their own regulating standards or methods, which would be stricter than those required according to the structure of laws and regulations at that time.

Early pollution control agreements were concluded with large companies in the new industrial area on the coastal reclaimed land in order to control increasing pollution originating from existing factories. In fact, since pollution originating from the new factories was much less than that from the existing factories, the pollution control agreements were very effective.

The agreements specified maximum pollution control targets, based on scientific data, and in light of present conditions and future prospects of air pollution, and of the level of pollution control technology available at that time. Although the agreements were much stricter than laws and prefectural ordinances established later, the companies recognized that scientifically reasonable standards based on large scale monitoring or a wind-tunnel test, were being set. The agreements played an effective role in introducing advanced technology and developing new technologies such as the country's first power generation by LNG, and the improvement in ground concentration of pollutants due to collective smokestacks.

Early pollution control agreements, which first targeted new factories, were later adopted by existing factories. Even after certain legal regulations were provided, the agreements were still innovative. For example, the agreements imposed stricter regulations than laws, or introduced total emission regulations while existing laws only regulated emission concentrations.

Residents' Movements

From the early 1960s, air pollution had become a serious problem in the existing coastal industrial zone. Residents were anticipating with alarm the arrival of still more factories in the

new coastal industrial zone. Residents around the zones formed a residents' organization called "Council for Conservation of Environmental Hygiene in Naka and Isogo Districts". They appealed to the national, prefectural, and city governments to implement pollution control measures. Anti-pollution campaigns by local residents in Yokkaichi and Mishima-Numazu affected this movement. Citizens' movements at that time not only promoted pollution control measures by Yokohama City, but also gave birth to the first pollution control agreement.

Thereafter, citizens' movements continued to support the city's pollution control measures. This was because the city kept residents well informed of the content and results of scientific experiments conducted by the city and factories, as well as the content and effectiveness of the agreements. This openness removed anxiety from residents, and the visual evidence of improvement in environmental quality enabled the city to win the residents' understanding and trust.

Companies' Reaction

Escalating anti-pollution demands from the public, and land sales contracts were the external factors that companies accepted in the early pollution control agreements. Since the city's investigation and finding were scientifically sound, the companies acknowledged the results and agreed to cooperate. On the other hand, internal factors that companies accepted such a strict agreement were as follows:

- Yokohama was blessed with a large consumer market in the outskirts of the capital;
- good economic conditions at that time eased negotiation of the agreements; and
- having abundant capital and management capacity, the large companies were able to cope with the pollution control costs.

As a result, the companies were able to pay for the costs of pollution control investment, and to maintain industrial competitiveness at the same time.

Later, the city signed other pollution control agreements with the existing factories. The following factors attributed to the successful agreements: First, the companies understood the Yokohama style when they reached early pollution control agreements with new factories. In addition, following increasing anti-pollution demands from the public, these companies that, in order to carry out their business in the future, it would be vital for them to obtain a consensus from local governments and residents when building or expanding factories. It turned out that to take pollution control measures is not so costly in long term and is affordable though large investments are required in the initial stage. Furthermore, from the factories' point of view, the conclusion of pollution control agreements meant a kind of authorization for pollution control measures from Yokohama City. As a result, the factories were able to build up good relationships with the residents.

Administrative Reaction

The city's administrative structure and staff

attitudes and skills for pollution control were key factors. The pollution control agreements were successfully implemented through frequent monitoring, on-the-spot inspections, and guidance. Such local effort has been an important tool to induce effectiveness of the measures and this has been a distinctive characteristic of the Yokohama administration. The city administration obtained residents' trust and cooperation, and maintained it by disclosing pollution information as openly as possible. Since the city set standards based on scientific data, the companies tended to accept them.

The Bureau of Pollution Control was established with its 10 staff members when the first pollution control agreement was concluded. Yokohama was able to avoid a vertical administration, though this is typical in the Japanese administrative structure, and it has maintained its flexibility to effectively handle the problems at hand. Since then, the administrative structure has basically stayed the same. Staff members were engineers who had received higher education, and were highly concerned about pollution issues and approached their task with enthusiasm and dedication. Moreover, the city made great efforts to improve its staff's capability and accumulated technology in the Bureau. This accumulation of technology, specifically reflected in the making of the Yokohama pollution control agreements that were based on scientific knowledge and technology, and helped the city win credibility and understanding from the enterprises which entered pollution control agreements.

Requirements for Effective Pollution Control Agreements

The experience of Yokohama city indicates the following requirements for effective pollution control agreements.

- The content of the agreements should be defined from a scientific and technological point of view, and not simply from an abstract and ethical point of view.
- A strict and rigid agreement is not always good. It needs to be adjusted according to the economic, technical and managerial capacity of the firm local characteristics.
- In order to check whether the companies carry out a comprehensive implementation of the agreements, it is necessary for the administration to be aware of best available protection technology. Therefore, it is desirable for the administration to maintain a certain number of qualified staff and train them. Local staff must have enthusiasm, as well as knowledge of advanced technology.
- It should be recognized that the pollution control agreements exist not only for the company and local government administration, but primarily for the residents' well-being.

Kanazawa Reclamation Project and Industrial Relocation The goal of the Kanazawa Reclamation Project was more than just creating land for industry and port as in the past. The ultimate goal was to reclaim land as a site for redeveloping the downtown area and accommodating small and medium-sized factories. Small and medium-sized factories scattered around the city were transferred into the Kanazawa Reclamation Land. This facilitated

rationalization of factory management through cooperation and systemization. The industrial relocation was also effective as a measure for controlling pollution including noise, vibration, and offensive odors.

Successes of the Project

Concern about living environment The reclamation project was formulated with careful consideration of environmental aspects and urban planning. The area was divided into the industrial and residential sites by a national road running North-South in the center of the reclaimed land. A 50 m wide green tract of land was also constructed as a buffer zone along the national road. The city secured about 10 percent of total reclaimed land for building a seaside park, a park on the old coastal line, and green buffer zones. The construction of the green buffer zones were funded by the Japan Environment Corporation.

Pollution control measures In order to prevent pollution from occurring in their new neighborhood, companies implemented the following pollution control measures after relocation: arrangement of factory location within the industrial complexes, establishment of treatment facilities, as well as individual measures within the factories themselves.

Accordingly, the city decided to locate some small and medium-sized industry in special sections of the Kanazawa Industrial Complex and let them discharge effluent to the collective treatment system after each factory removed some hazardous substances. To have a collective treatment facility is much more economical than the case where each factory has its own industrial treatment facilities because the former requires less space for the treatment facility installation and less operation and maintenance costs.

Costs of construction, operation and maintenance of the collective facilities are borne by the user companies. The facilities were constructed by using a 30-years low interest loan provided by the Japan Environment Corporation. Yokohama city subsidized a part of the interest. Annual operation and maintenance costs are settled by the user companies according to a certain formula using contract and actual effluent volume, as well as effluent density.

Collective treatment proved more economical than individual treatment. It also made possible for Yokohama city to easily monitor the effluents of the user companies, and to give them appropriate guidance.

Incentives to relocate (land price and financial subsidy) The incentives included the availability of necessary infrastructure on the site, and low cost requirement of the relocation.

The initial sales price of industrial site was 30,000 yen/m. However, it actually increased to 50,000 - 60,000 yen/m^2 due to delays in granting reclamation licenses and soaring construction costs. There was considerable doubt as to whether the targeted small and medium-sized businesses could afford for relocation. The city therefore reduced taxes for the factories concerned over a limited period, exempting them from property tax, corporation tax, and the special land holding tax.

Taking advantage of factory relocation, the city tried to reform and rationalize management of small and medium-sized factories by promoting collective and cooperative actions, as well as improving organization in the factories themselves. Organizational promotion made it possible for small and medium- sized companies, which were financially weak, to obtain public funds such as the promotion fund for small and medium-sized companies and loans from Japan Environment Corporation.

Project execution organization The Kanazawa Reclamation Project in Yokohama was implemented by inter-departmental effort involving Planning and Co-ordination Division, Pollution Control Bureau, and 10 other bureaus of Yokohama city. Officials of those organization formed both the steering and technical committees for the project.

Unsuccessful Aspects

Process of factory relocation The city introduced criteria to prioritize the districts from which relocated factories should be drawn. Criteria included the presence of residents and industries located in close proximity to each other, existing environmental conditions, and managerial capability. Based on the results of this investigation, the city selected factories which would require relocation, and then encouraged the process. Although the city initially wanted to relocate 2,000 out of 6,000 small and medium-sized factories, only about 400 factories were actually relocated. Many factories which caused pollution could not be relocated due to the lack of relocation funds. Moreover, about 40 percent of the factories relocated were previously located in the semi-industrial area, and not in the mixed residential-industrial area. It may be said that more factories could have been identified and relocated if the city had identified candidate factories from only residential areas or commercial areas and excluded semi-industrial areas, and if more time had been spent for such identification. However, the city's financial burden of interest payments prevented the city from spending more time for the identification.

Utilization of vacated sites Yokohama either purchased the vacated sites from the relocating factories and constructed public facilities such as park, or attempted to conclude agreements with the companies regarding the utilization of the vacated sites. In the latter case, companies were required to have prior consultation regarding their disposition, thereby limiting the future uses of the sites. However, both parties sometimes could not reach an agreement on sales prices. The city could not control the use of vacated land effectively.

Conclusion on Environmental Protection Measures in Yokohama

The national environmental standard is a minimum standard to be complied with. National standard are not necessarily adequate for some cities where pollution problems are serious. For this reason, in order to protect local residents' health and living environment, Yokohama City found it necessary to implement its own mea-

sures through pollution control agreements or guidelines/guidance.

The experience of Yokohama presents an example of a local government which has successfully implemented its own environmental protection measures. To this end, it requires a comprehensive plan of actions including not only environmental protection but also local economic policy and local living environmental policy.

The Yokohama experience also demonstrated the importance of gaining the trust from local residents and companies. To obtain this, the city:

- aimed at rational, objective and effective city management
- trained special staff in environmental administration
- established cooperative relationships with external specialists and research institutions
- encouraged residents' participation and established a system to listen to residents' opinion in the city management
- disclosed environmental and other information including environmental issues as much as possible.

The City of Yokohama has obtained trust from the residents for its individual measures such as municipal reform and residents' participation. These efforts made it possible for the city to successfully negotiate with companies about the pollution control agreements and to maintain effective relationships with the central

Osaka

Summary of Environmental Protection Measures in Osaka In the pre-war period, the western coastal industrial area in Osaka City had been a heavy chemical industrial area which supported national production. Once the area had been burned out due to WWII, it was revitalized again with the post-war economic revitalization and high economic growth. The area has a great number of small and medium-sized companies. In the pre-war period, air pollution due to soot and smoke became problems. The City of Osaka, with the cooperation of the Osaka prefecture, took measures for soot and smoke control at the beginning of the 1900s. These activities included an increase of the awareness on pollution to industries and citizens, guidance on improving the coal combustion method, monitoring of dust fall, and research on pollution's influence on economy. The activities provided precious data on air pollution in the post-war period. It took time to identify the cause of land subsidence which was found in 1934 (Actually the cause was identified after WWII). WWII interrupted these measures, but subsidence monitoring was continued during the war.

Since urban infrastructure such as sewage treatment plants with the activated sludge method and the incineration facilities were well advanced in the pre-war period, water pollution and waste problems were not as serious as air pollution and subsidence. In the post-war economic revitalization and growth, "soot, smoke and dust" due to coal, and "subsidence" due to

the excessive pumping of ground water became manifest. The "Jane Typhoon" (1950) and the "Second Muroto Typhoon" (1961) made the disadvantage of subsidence clear, and the coastal area suffered significant damage because of flood. Making a priority of the "subsidence measures", the City of Osaka ended subsidence in a short period by improving breakwater, increasing the heights of the bridges, regulating the pumping of ground water, and constructing an industrial water supply system including extensions of cooling towers.

Then, the City addressed measures for controlling air pollution, which had become much worse. Luckily, with many technical staff in the public health division and a rich accumulation of monitoring and measurement data on air pollution in the Sanitation Research Institute, it did not take much time to develop the air pollution control system. Especially, research to ascertain the conditions of air pollution had accumulated abundant know-how in both public and private sectors. The measures taken included a broad monitoring network, the improvement of monitoring methods, research on automatic monitoring equipment, and the detection of air pollution by visibility monitoring.

In the latter half of the 1950s, the city responded to the complaints on pollution damage in advance of the national legislation, established self-protection-through-soot-and-smoke organizations by local companies, and held a soot and smoke protection month. These measures originated in the pre-war history of soot and smoke control. Fortunately the Osaka City Pollution Control Council (established in 1962) included enough scientists who are specialists in public health and labor sanitation as members. These scientists took leadership in systematizing an administrative strategy from the public health point of view.

Considering the special characteristics of Osaka, the council designated the "western coastal industrial area of the city" as the "area for special measures", which is divided into the "area for large factories" and the "area for small and medium-sized factories". The council advised the City to take different measures at the same time. The action taken for the "area for large factories" called for a "special measure in the Konohana ward". This measure consisted of organizing the existing large factories in the area into groups based on technical similarities and encouraging them to design a pollution control plan by themselves. This way, the City did not have to use a large number of technical staff for this area. The measure used for the "area for small and medium-sized factories" was implemented by the "Pollution Special Task Force in Nishi Yodogawa ward". This measure was aimed at improving many factories in the area in a short period by using many technical staff in the City, since these small industries did not have the capability to undertake their own plan.

Since large companies could use national financial sources to control pollution, the city concentrated on supporting small and medium-sized companies. The city formed two supporting measures, namely the "Osaka City Loan for the Installation of Anti-Pollution Equipment" and the "Purchase System for Sites of Relocated Pollution Source Facilities", based on inquiries from small and medium-sized companies. This latter mea-

sures resulted in a project which collectively transferred the factories located in the residential area to an industrial site.

The city had accumulated abundant monitoring data through the air pollution monitoring network, and precise research data on causes of smoke from factories including facility size, fuel, materials, and the height of the smoke stacks, based on the inspection of many factories. Furthermore, using the dispersion coefficient which was obtained by an air tracer experiment, the city calculated the degree of each factory's influence on the pollution by a simulation method, and calculated the reduction rate. Thus, the city could make a persuasive and scientific argument to business owners and technical staff. The influence rate of each factory was the most pervasive factor in solving the problem of industrial air pollution in the city. In areas of high concentrations of pollution, national standards would not be stringent enough. Therefore, it was necessary for the city to set its own targets. The above examples illustrate how the city involved business owners with the implementation of pollution control measures. With respect to automobile exhaust pollution, which is impossible for any one municipality to regulate, the City of Osaka implemented its own campaign, and supported national regulatory measures with the related administrative agencies.

An anti-pollution campaign through the mass media (newspaper and television) started in the 1960s. It raised public awareness on the merits of pollution control by drawing attention to the actual, alarming levels of pollution, promoted new mayors whose primary concern was pollution control in large cities, and facilitated the provision of national pollution related laws. The City of Osaka could promote its pollution countermeasures without having any legal authority over factories because the city received a lot of support from public opinion, which the mass media had helped form.

At first, industries opposed pollution control measures, regarding them as an impediment to industrial development. However, as the conditions of pollution worsened each year, the corporations themselves suffered adverse effects due to pollution, and they belatedly recognized their social responsibilities. Industrial groups such as the Industrial Pollution Prevention Research Association under the Osaka Industrial Association and the Industrial Pollution Consultation Center under the Osaka Chamber of Commerce and Industry became active. The Soot and Smoke Control Association was established in each administrative district, and was very effective in controlling pollution. There was also a lot of development in pollution control technology and improvement of equipment by factories. Factories made many proposals to technical staff in administration and provided a great amount of technical information. The good sense and good faith of Osaka factories should be highly respected.

As the "Quiet Town Campaign" indicates, pollution was controlled not by ordinances but by the citizen's self discipline. When pollution reached its worst, the administration designed measures based on scientific proof and obtained support from the mass media and the citizens. At the same time, the companies recognized their social responsibilities, and cooperated with the administration. This

occurred primarily because Osaka has a 400-year tradition of self-governance by residents.

Reasons for the Success of Pollution Control Measures in the City of Osaka

Japan's administrative structure consists of three levels: central, prefectures, and municipalities and measures determined by central policy-making are implemented through them. When industrial pollution became prominent, the center and the prefectures had regulatory authority for industrial pollution through laws and prefectural ordinances. Unfortunately, the measures were neither effective nor concrete. Citizens who suffered pollution damage complained only to a local administrative branch under the city office which had no authority to act. The City of Osaka passed the citizens' complaints to the Osaka prefecture, and asked for measures. The complaints sometimes bypassed the Osaka prefecture and were sent to a branch of the national agency. However, there was almost no response. The reasons for the success of pollution countermeasures in the City of Osaka under these circumstances were as follows:

■ Ground subsidence has been a critical problem in Osaka since the pre-war period. The public and private sectors cooperatively implemented subsidence prevention ordinances ahead of national measures, and established a system to implement measures. Osaka used the approach of public and private cooperation.

■ In the pre-war period, there was a movement to improve air quality on the part of the administration, researchers and business circles, and various data was accumulated. These preparations led to soot and smoke control in the 1950's.

■ The Osaka mayor prioritized removal of industrial pollution as the most important policy in the city, and designed a strategy for pollution control based on available technology in cooperation with scientists and researchers.

■ To implement the strategy, the City of Osaka formed an administrative organization for pollution control whose members consisted mainly of environmental sanitation monitoring staff (pharmacists and veterinarians) and technical staff specializing in civil engineering, architecture, machinery, and electricity, all selected from city agencies. Furthermore, the "Pollution Control Engineer Group" was quickly organized through preferential hiring of graduates who majored in environment and sanitary engineering in universities. Since they already had a technical background, special training was not necessary.

■ The City of Osaka systematized financial support measures, such as the "Osaka City Loan for the Installation of Anti-Pollution Equipment" and the "Purchase System of the Site of Relocated Pollution Source Facilities" for small and medium-sized companies and gave them priority when dispensing financial assistance.

■ With respect to urban waste water, the city set up guidelines for a basic policy and implemented infrastructure beginning from the pre-war period.

■ The following two factors were most important:

i) The city's proper recognition on the importance of scientific and technological support in the solution of industrial pollution, that was

based on a tradition of cooperation with industry

ii) Firm decisions from the top and the creation of a technical group were key to the success of the measures to control industrial pollution.

■ The reasons for the success of measures to control soot and dust, and SOx in the city were: a national fuel policy which demanded conversion from the use of coal to the use of oil, and an energy policy which favorably allocated lower sulfur heavy oil to areas with serious levels of air pollution, like Osaka.

■ Since gas was already in use city-wide, it was easy for factories to convert to gaseous fuel.

■ The cooperative attitude of local corporations to pollution control, based on their sense of responsibility towards their local society.

■ The groups of private companies such as the Osaka Industrial Association tried to implement pollution control measures jointly by all of the industry circle members through meetings and discussions, and by providing training and education, etc.

■ The support from mass media that appealed to residents was a very important factor.

Around 1970 in Japan, the problem of pollution worsened due to rapid industrial expansion. Since pollution had an adverse effect upon all parts of society, including residents, corporations, and administrations, solving the problem of pollution became an important national issue. At that time, a large sum of money was invested into controlling pollution, and the investment was part of the basis for economic growth. Thereafter, the gain from energy saving balanced the cost of pollution control measures through process change.

Technology Transfer to Developing Countries

Technology transfer in terms of environmental protection includes both administrative measures, and hard technology, such as pollution control equipment. Politics, the administrative system, and economic conditions are diverse in developing countries. Therefore, the pollution countermeasures in developing countries should be selected according to its local applicability.

The following elements in the experience of Osaka are important for developing countries:

■ Use scientific methods. In order to design and execute the measures based on science or technology, staff with a high level of technological expertise should be hired and educated.

■ Establish a cooperative system between public and private sectors. This is one of the major characteristics of the experience of Osaka. The technical staff in the city administration at the city and district levels and the engineers in factories cooperated, and enhanced technical standards. This experience indicates that it is important to have cooperation between public and private sectors.

■ Encourage industry associations to establish waste minimization and pollution control committees and advice functions to provide outreach and training to their members.

■ Focus on hot-spot areas in the city for

intensive pollution control measures to achieve desirable results.

- Establish a financial system that supports corporations which introduce pollution control technology. The City of Osaka created a system which helped small and medium-sized companies that were short on financial resources. Under that system, a loan was released after technical screening of treatment equipment was conducted.

With respect to pollution control equipment, the applicability of hardware technology to developing countries depends on the certain conditions. Without considering these following conditions, technology transfer will fail:

- **Energy supply:** The appropriate control equipment depends upon the available energy sources and their reliability. For example, if municipal gas is provided in the cities, its use can greatly improve air quality.
- **Technical Standards:** Since equipment needs maintenance, it is necessary to consider the parts production capability and the repair capability of small enterprises. Pollution control equipment which cannot be handled by the technical capability of users should be phased out.
- **The legal system, location conditions, and degree of environmental pollution:** These three factors should be considered when determining the most efficient method of removing pollution. It is also necessary to take the local environmental conditions into account.
- **Economic strength of industries:** Substantial funds may be needed to maintain the pollution control and the monitoring equipment. Considering the cost, pollution control equipment whose capital and maintenance cost is on par with the economic strength of the firm should be introduced.
- **Educational standards:** Due to the difficulty of training engineers up to the necessary educational standards, pollution control equipment should be introduced with consideration given to the difficulty of operation and maintenance.

A prerequisite for effective pollution control measures is to ascertain current conditions. In order to comprehend the characteristics of air pollution, for example, it is necessary to know how it changes in time and space. It is sufficient to have a monitoring system that combines minimum automatic monitoring stations with maximum simple monitoring points selected on a case by case basis. Having a monitoring system which needs expensive maintenance costs should be avoided, although some Japanese municipalities use it. Each individual treatment equipment cannot be discussed here. However, many factories in the City of Osaka are using different pollution control facilities, varying in treatment method, treatment efficiency, and facility size. These equipment should be good examples to review when introducing pollution control equipment to developing countries.

Kitakyushu

Summary of the Kitakyushu Report Kitakyushu was born from the union on equal terms of 5 neighboring cities in 1963, and is a city which has developed as one of Japan's prominent heavy

chemical industrial areas. The smoke which was formerly the symbol of prosperity and called "the seven-colored smoke" was rich in dust and sulfur dioxide. The Kitakyushu area is home to many large iron and steel, chemical, ceramics, and electric power corporations, and it was already a major source of air pollution and water pollution before the Second World War. Particularly after passage through the post-war reconstruction period and upon entry into the so-called high-level economic growth period of 1955-1965, air and water pollution markedly intensified. In districts surrounded by large factories involved in ceramics, chemicals, iron and steel, etc., there were many residents who suffered from the large quantities of dust fall and from the smoke and offensive odors. On the basis of fact-finding surveys of the damage, the residents repeatedly submitted demands for improvement to the corporations, and petitions to the administration. Moreover, in Dokai Bay, which is located in the north-central part of the city and where the fish harvest had showed signs of recovery during one period after the war, fish catches dwindled to nothing from 1950 onward. This was caused by the large quantities of industrial waste water from neighboring corporations and sewage which flowed into the bay, and pollution in Dokai Bay greatly worsened.

In response to this situation, prior to the commencement of serious countermeasures by the national government, various policies were devised in Kitakyushu. For example, the measurement of dust fall began in 1953 as a means of monitoring air pollution. Upon the birth of the city of Kitakyushu in 1963, the creation of a mature system was sought by developing a pollution administration organization and establishing a Pollution Control Council. In 1967, the first pollution control agreement of this city was concluded between the city and a corporation. After the enactment of pollution-related laws by the "Pollution Diet" at the end of 1970, the pollution countermeasures of the city were markedly reinforced, and were implemented in a comprehensive, systematic and steady manner.

As a result, the air and water quality of Kitakyushu became markedly cleaner, so much so that Kitakyushu was introduced in a 1985 OECD's White Paper on the Environment as a city which had undergone transformation from a "city of gray" to a "city of green." In 1987, Kitakyushu was selected as a "star light town" by the Environment Agency in view of its excellent air environment. Furthermore, the water quality of Dokai Bay greatly improved, and it was confirmed that 115 species of fish inhabited its waters.

When the history of pollution countermeasures in Kitakyushu is reviewed, there are certain characteristic points which may be cited. First, there is the transfer to this city of the authority of the prefectural governor for purposes of issuing "smog alarms." In all Japan, this transfer of authority was made to Kitakyushu alone, and was permitted in view of the problems of distance from the city of Fukuoka which is the seat of prefectural government. This transfer of authority to a self-governing community which was the site of pollution exerted major effects on pollution countermeasures— for example, it became an important factor in the development of the

"Special Weather Information System" as a pollution prevention measure.

In order to understand the pollution countermeasures in the Kitakyushu area, one must consider the cooperative system of industry and government, and the existence of strong leadership in the business community which supported it. On the local level, the obligation of the local self-governing body was to seek industrial development while simultaneously protecting the health of the residents, and a comprehensive administrative management was required which did not lean toward selection of either "industrial development" or "environmental protection" as one of two alternatives. For this reason, it was indispensable to establish consultative organs for purposes of building cooperative relations between the administration and the corporations. In these councils, the administration and the corporations would conduct a full exchange of views and discussion, and this process guaranteed implementation of the concluded pollution control agreements which were not based on laws or ordinances accompanied by strict regulations.

As the pollution countermeasures began to show their effectiveness, the fish returned to Dokai Bay. The problem which then arose was the need to dredge the sludge containing inorganic mercury which had accumulated on the seabed of Dokai Bay. If neglected, the inorganic mercury in the sludge would become organic and be released into the seawater, whence biological accumulation in the fish would occur, and it was feared that the health of the citizenry might be impaired by the catching and eating of such fish. Thus, amid circumstances where it was difficult to scientifically estimate the degree of future organic mercury contamination and the degree of danger if the matter were neglected, the Dokai Bay dredging project commenced. This was not a policy measure based on a strict cost-benefit analysis, but rather a project executed from a risk-management perspective.

On the other hand, the corporations, who were the object of strict regulations by the administration and from whom the observance of the agreements was requested, devised various measures of their own. As one of the characteristics of Kitakyushu, one may cite the sulfur oxide countermeasures based on the independent wind tunnel tests of the corporations. In this process, the maximum ground level concentrations to be observed by the corporations were presented by the administration, and each corporation formulated a reduction plan in its own preferred manner to develop the countermeasures. By this means, fairness among the various corporations was maintained, there was a large range of options in each corporation, and the persuasiveness vis-a-vis the central corporate managers was large — all of which contributed to the promotion of the pollution countermeasures.

Next, it should be mentioned that the pollution prevention technologies introduced by the corporations centered on cleaner production (CP) technology, with pollutant removal equipment playing a supplementary role. For example, in the iron and steel industry, such cases included the development and introduction of the pre-combustion desulfurization system for coke oven gas, and of the so-called OG system which conducted dust removal by a

non-combustion system for converter gas. The conversion from a fuel oil single combustion system to natural gas which had no sulfur content whatsoever is another example of such technology. Thus, many of the pollution prevention technologies adopted by the corporations were low-pollution production technologies.

Evaluation of the Antipollution Policies of Kitakyushu

Next, an evaluation is attempted of the antipollution policies of Kitakyushu. First, with regard to the transfer of authority to a local self-governing body, one can point out the effects on the city's own policies due to the smog alarm issuance authority which was given to Kitakyushu in February 1970. This type of transfer of authority to the locality not only raised the consciousness of the local administrative officials, but also of a wide range of the local citizenry including the corporations, and this resulted in the stepped-up promotion of local pollution prevention initiatives. For example, one may cite the establishment of the "special weather information system" and the requests to corporations for pollutant reduction based thereon, which effectively shifted the emphasis from after-the-fact countermeasures to preventive measures. With the introduction of this system, it became possible to execute substantive pollution countermeasures without issuance of a smog alarm. On the corporate side, efforts toward in-house pollution prevention advanced, as evidenced by the provision of pollution monitoring personnel who conducted visual pollution inspections, and the development of a system capable of rapidly responding to pollutant reduction requests from the city which could come at any time. Thus, the effects of the transfer of authority to the local self-governing body responsible for the pollution sites may be said to have been large.

The next point relates to the existence of a cooperative system of government and industry, and its effective operation. Viewed from the standpoint of foreign countries, this type of consultative system might appear to constitute collusion between the government and the corporations, but it was an extremely effective system with regard to industrial pollution prevention. Once an agreement was reached in such a consultative forum, the administration and the corporations who were its members felt bound by these decisions despite the lack of any legal measures, which was an attitude rooted in the particularities of Japanese society. Moreover, in Kitakyushu, since there existed a strong leadership in the business community which served to bring together the corporations, this type of government-industry cooperative system was built up relatively smoothly compared to other localities.

The basic countermeasures adopted by the pollutant emitting corporations were characterized by the improvement of the manufacturing equipment and the manufacturing process, as well as the raising of productivity while striving for thorough-going resource conservation and energy conservation — it was from these efforts that the pollution countermeasures developed. This led to the introduction of so-

called cleaner production technology (CP technology). This concept did not involve the addition of equipment for waste water treatment and waste gas treatment (end of pipe or EOP technology), but sought pollution prevention by replacing the existing production technology itself with low-pollution production technology, and signified the reduced consumption of raw materials and fuels which constituted sources of pollution, as well as the reduced generation of by-products which constituted sources of pollution. Here, it is necessary to give special mention to management policy which, even in the chilly economic climate occasioned by the oil crisis, held to a long-term view of corporate development by daring to strive for the introduction of CP technology. In the Kitakyushu area, representative examples of this are the joint introduction of natural gas by electric power and iron and steel corporations, and the introduction of the OG system in the iron and steel industry.

Furthermore, as one example of the "non-economic approach" which is cited as a characteristic of Japanese antipollution policy, there is the sedimentary sludge dredging project of Dokai Bay, which was once called the "Sea of Death" and which is located in the central part of Kitakyushu. The sludge which accumulated in Dokai Bay from the opening of Dokai Harbor in July 1898 until March 1972 was estimated at approximately 4.8 million m3. Of this amount, the project dredged 350,000 m3 of sludge containing more than 30ppm of mercury, and buried it in a special-use disposal area established in the bay. Of the total project costs of 1.8 billion yen, 71% was borne by the corporations and 29% by the administration. Amid circumstances where it was difficult to scientifically estimate the degree of future organic mercury contamination and the degree of danger if matters were left unchanged, the sedimentary sludge dredging project of Dokai Bay was conducted. Thus, this project was not executed based on economic principles which gave priority to profit considerations after a comparison of the costs of dredging and the profits to be derived therefrom, but rather, it was a crisis-(risk-)management policy designed to cope with future risks and to control the actual sense of crisis among the local citizenry which was not necessarily based on a scientific underpinning. In this context, it is highly significant that, as a result of these pollution countermeasures, the fish taken in the cleaned up waters of Dokai Bay can now be eaten with peace of mind.

The Applicability of the Experiences of Kitakyushu to the Developing Countries

When applying the pollution prevention experiences of Kitakyushu to the developing countries, it is necessary to pay attention to the special social conditions in which Kitakyushu developed. On the other hand, for the cities of the developing world which have traveled a historical course similar to Kitakyushu, these experiences may prove very useful. The industry of Kitakyushu did not undergo the ordinary process of industrial development by passing from light industry to heavy industry, but began from the establishment of the Yawata

Steel Works by state funding in circumstances where no industry existed at all. In the developing countries, as well, there are cases where gigantic corporations are established in areas without any industry in the form of state-run enterprises or multinational corporations. In this case, as with the former city of Yahata, a "Castle town" is formed around this one gigantic corporation.

Yahata was succeeded by Kitakyushu, which developed as a government ordinance designated city and which came to possess the issuance authority for smog alarms. There may be problems concerning limitations on local self-governing bodies in the developing countries, and if the transfer of authority to localities specializing in pollution countermeasures becomes possible hereafter, they might be able to execute the types of policies adopted by Kitakyushu. In particular, even if there exists no authority for direct regulation of corporations by a local self-governing body which has jurisdiction over the area in which the corporate giant is located, it can arouse the concern of the local citizenry and the mass media by issuing something similar to smog alarms, which might create good prospects for subsequent pollution countermeasures. For this purpose, it is indispensable to build up a scientific monitoring system, conduct data collection and analysis, and train capable people to handle these matters.

With regard to the apportioning of responsibility for the pollution in Kitakyushu, if considered in terms of the comparison of industry and domestic sources of pollution, it must be noted that industry played an overwhelmingly larger role. For example, considering the proportional amounts of the COD discharged into Dokai Bay, at the time more than 97% was of industrial origin. On the other hand, in the major cities of the developing countries, it is reported that industry is responsible for 20-30%, while the major part of the pollution is derived from daily living. With regard to air pollution, the role of automobile exhaust gas is large, while with regard to water pollution, the sewage and refuse deriving from ordinary households and particularly from slums and squatter districts are the major factors. Concerning pollution countermeasures in such cities, even if it is an area where a gigantic corporation is located as in Kitakyushu, the experiences of Kitakyushu might not prove very useful. This is because, even if industrial pollution is overcome, there still remains the problem of the pollution deriving from urban living.

Next, we consider the introduction of low-pollution industrial technology. The introduction of terminal treatment devices for pollutants (EOP technology) is expensive, but there are developing countries which are planning the development and introduction of low-priced and simplified devices which somewhat sacrifice treatment efficiency. As pollution countermeasures for existing facilities, the introduction of such EOP devices may be unavoidable, but if there are factories where poor production efficiency due to deteriorated production equipment is to be improved and where the renovation of the production facilities themselves is being considered for this purpose, it may well be worthwhile to study the introduction of CP technology. The high

costs of EOP technology probably indicate the importance of planning and preventive measures by developing countries before the problems are too costly for them to rectify. In the case where it is planned to introduce CP technology to improve production facilities in developing countries, if an organization is established incorporating environmental ODA (Official Development Assistance) from the developed countries, a further impetus will surely be given to the introduction of CP technology in developing countries. For Japan which is a major CP technology country, and for Kitakyushu, there are not only the profits accompanying these technology exports, but also expectations for business undertakings of great advantage to both sides.

Case Study Report Structure

The following describes the case study report structure which is shared by three subject cities:

Chapter 1: Description of natural and socioeconomic conditions and history of the subject cities.

Chapter 2: Actual level, causes and extent of damage of environmental pollution in each main historic period. Chronological description of special measures and strategies adopted by the subject city.

Chapter 3: Particularly important or effective pollution control and environmental conservation measures adopted by each city, and those which are specific to each city. The factors behind the adopted measures.

Chapter 4: Measures adopted by private companies in each city, their contents, background, and underlying factors which contributed to the relevant decision-making by each company. Effects and problems associated with the various measures.

Chapter 5: Summary and conclusions

Annex 2 : Program of MEIP/Japan Seminar on Urban Environmental Management

9/28 (Tues.) Date of Arrival

MEIP/JAPAN STUDY TOUR

9/29 (Wed) Yokohama Meeting (at Yokohama Symposia)

10:00	Opening M.C.: Mr. Suzuki (World Bank)
10:00-10:15	Welcome speech: Director of the Yokohama Environmental Protection Bureau
10:15-10:30	World Bank speech: Mr. David Williams
10:30-10:40	Explanation of entire Japan Seminar Program: Mr. Suzuki (World Bank)
10:40-11:00	Introduction by each participant
11:00-11:20	Coffee Break
11:20-11:35	An Introduction to Yokohama City (video tape)
11:35-12:20	Presentation: Yokohama City's Experience of Environmental Management, Mr. Katsumi Saruta (Chairperson of Yokohama Committee)
12:20-13:30	Lunch Afternoon Session Chairperson: to be identified
13:30-14:40	Supplementary Presentation: Messrs. Kawasaki and Mutoh, (Members of Yokohama Committee)
14:40-15:00	Coffee Break
15:00-16:30	Discussion
16:30	Closing
18:00-20:00	Reception (sponsored by Yokohama City and the World Bank) - Opening - Mayor's greeting - Toast - Information by Secretariat

9/30 (Thurs) Yokohama Field Trip

8:40	Departure from hotel (charter bus)
9:20-10:20	Isogo Coal Fired Power Plant: Electric Resource Development, Inc.
10:20-11:00	Bus
11:00-12:00	Kanazawa Cooperative Waste Water Treatment Facilities: Japan Environmental Corporation
12:00-13:00	Lunch (scheduled location at MITI Training Center)

13:00-14:00	Wrap-up session (including Presentation by representative of MITI
About 19:30	Check into hotel

10/1 (Fri) Osaka Meeting (at International House, Osaka)

9:00	Opening M.C.: Mr. Suzuki (World Bank)
9:00- 9:15	Welcoming speech: Osaka City Environmental Health Bureau or GEC
9:15- 9:35	World Bank speech: Mr. David Williams
	Introduction of participants (GEC will introduce participants from Osaka City)
9:35- 9:50	An Introduction to Osaka City (video tape)
9:50-10:00	Coffee Break
10:00-10:45	Chairperson: to be identified
	Presentation: Osaka City's Experience of Environmental Management, Mr. Yukimasa Saito (Chairperson of Osaka Committee)
10:45-11:25	Supplementary Presentation: Messrs. Matsumiya and Nakano (Members of Osaka Committee)
11:25-12:30	Discussion
12:30-13:30	Lunch
13:30	Departure (bus)
14:00-15:00	Osaka City Environmental Pollution Monitoring Center
15:00-15:30	Bus
15:30-16:30	Morinomiya Incineration Plant
About 17:00	Return to hotel
17:00-18:00	Wrap-up Session
18:30-20:00	Reception (sponsored by the City of Osaka)

10/2 (Sat) Field Trip to Kyoto

9:00	Departure from hotel (all day bus ride)
18:00	Arrival at hotel

10/3 (Sun) Travel

Morning	Freetime
13:28	Bullet Train (Nozomi train number 11)
15:42	Arrival at Kokura

MEIP/JAPAN SEMINAR ON URBAN ENVIRONMENTAL MANAGEMENT

10/4 (Mon) (at Kitakyushu International Conference Center)

9:00	Opening M.C.: World Bank
9:00- 9:15	Welcoming speech: Director of the Kitakyushu City Environmental Protection Bureau (interpretation provided)
9:15- 9:30	World Bank speech: Chairperson: Mr. Michio Hashimoto
9:30- 9:50	Outline of Study on Japanese Experience on Environmental Management: Mr. Aoyama/Ms.Nakazawa (EX Corporation)
9:50-10:10	Coffee Break
10:10-11:00	Presentation (1) Summary of Main Report from Institutional Aspect :Mr. Kazuhiko Takemoto
11:00-11:30	Presentation (2) Summary of Main Report from Economic Aspect: Mr. Jerry Warford
11:30-12:00	Discussion on Main Report (1)- Relevance of Japanese Experience and Strategy to Transfer Japanese Experience to Developing Countries: Mr. Tom Walton
12:00-13:30	Lunch
13:30-14:00	Discussion on Main Report (1)- Continuation of the Presentation by Messrs. Nakamura and Sakurai (Members of Central Steering Committee)
14:00-15:00	Question & Answer
15:00-15:15	Coffee Break
15:15-16:45	Discussion on Main Report (2)-Comments/presentation by MEIP Delegates on Transfer of Japanese Experience to MEIP Cities
16:45	Closing

10/5 (Tues.)

	Chairperson: World Bank
9:00-12:00	Wrap-up Session: Action for the Future
12:00	Closing

International Symposium on Asian Environment by Kitakyushu City/UNCRD ; Creating Environmentally Friendly Urban Environment (Open to the public)

14:00-14:10	Opening Address: Mayor of the City of Kitakyushu Congratulatory Address: Environment Agency

14:10-15:55	Panel Discussion "Creating Environmentally Friendly Urban Environment" Moderator: Mr. Hiroyuki Ishi, Executive Editor of the Asahi-Shinbun Panelists: Dr. Jerry Warford; Guest Professor of London University Dr. Surin Setamanit; Professor of Chulalongkorn University, and Former Minister, Ministry of Science, Technology and Energy , Thailand Dr. Michio Hashimoto; President of OECC Mr. Koichi Sueyoshi; Mayor of the City of Kitakyushu
15:55-16:10	Coffee Break
16:10-17:00	Key-note Speech "Urban Environment After Rio Summit": Sir Shridath Ramphal; Member of WCED, and Former Secretary-General of the British Commonwealth
17:00	Closing
19:00-21:00	Reception

WB/UNCRD/Kitakyushu Seminar on Urban Environmental Management in Asia

10/6 (Wed)

9:00- 9:30	Opening Address: Director-General, Environment Bureau, City of Kitakyushu Director of UNCRD Representative of the World Bank
Session (1):	**Urban Environmental Management in Japan: A Case Study of Kitakyushu City**
9:30-10:15	Presentation: Kitakyushu's Experience in Environmental Improvement, Mr. Yukio Shiraishi (Chairperson of Kitakyushu Committee)
10:15-10:30	Coffee Break
10:30-11:00	Comments: Messrs. Nakazono and Hegi (Members of Kitakyushu Committee)
11:00-12:00	Discussion
12:00-14:00	Lunch
Session (2):	**Urban Environmental Management in Japan: A Case Study of Kitakyushu City**
14:00-17:00	Field Visit: Nippon Steel Corporation (a case study on "Cleaner Production")
17:30-18:30	Wrap-up Session on Kitakyushu Study

10/7(Thurs)

Session (3):	**Urban Environmental Management Strategies in Asian Cities**
9:00- 9:45	Presentation : MEIP Japanese Experience and Suggestion to Asian Cities, Mr. Jerry Warford
9:45- 10:35	Presentation by MEIP Cities

	Report (a) Beijing
	Report (b) Bombay
10:35-10:50	Coffee Break
10:50-12:30	Report (c) Colombo
	Report (d) Jakarta
	Report (e) Manila
	Report (f) Kathmandu
12:30-13:45	Lunch
Session (4):	**A Comparative Analysis of the Japanese and Other Asian Experiences in Urban Environmental Improvement**
13:45-15:45	Panel Discussion
	Moderator: Mr. Kunitoshi Sakurai
	Presentation(a) Relevance of the Japanese Experience in Urban Environmental Management to Asian Cities from a Thai Viewpoint, Mr. Surin Setamanit
	Presentation(b) Relevance and Transferability of the Japanese Experience to Other Asian Cities, Mr. Masahisa Nakamura
	Discussion Discussants: Messrs. Surin Setamanit, Masahisa Nakamura, Representa tives of MEIP Cities(Messrs. Mukhopadhyay and Ramanujam) and the World Bank (Mr. David Williams)
15:45-16:00	Coffee Break
16:00-17:00	General Discussion

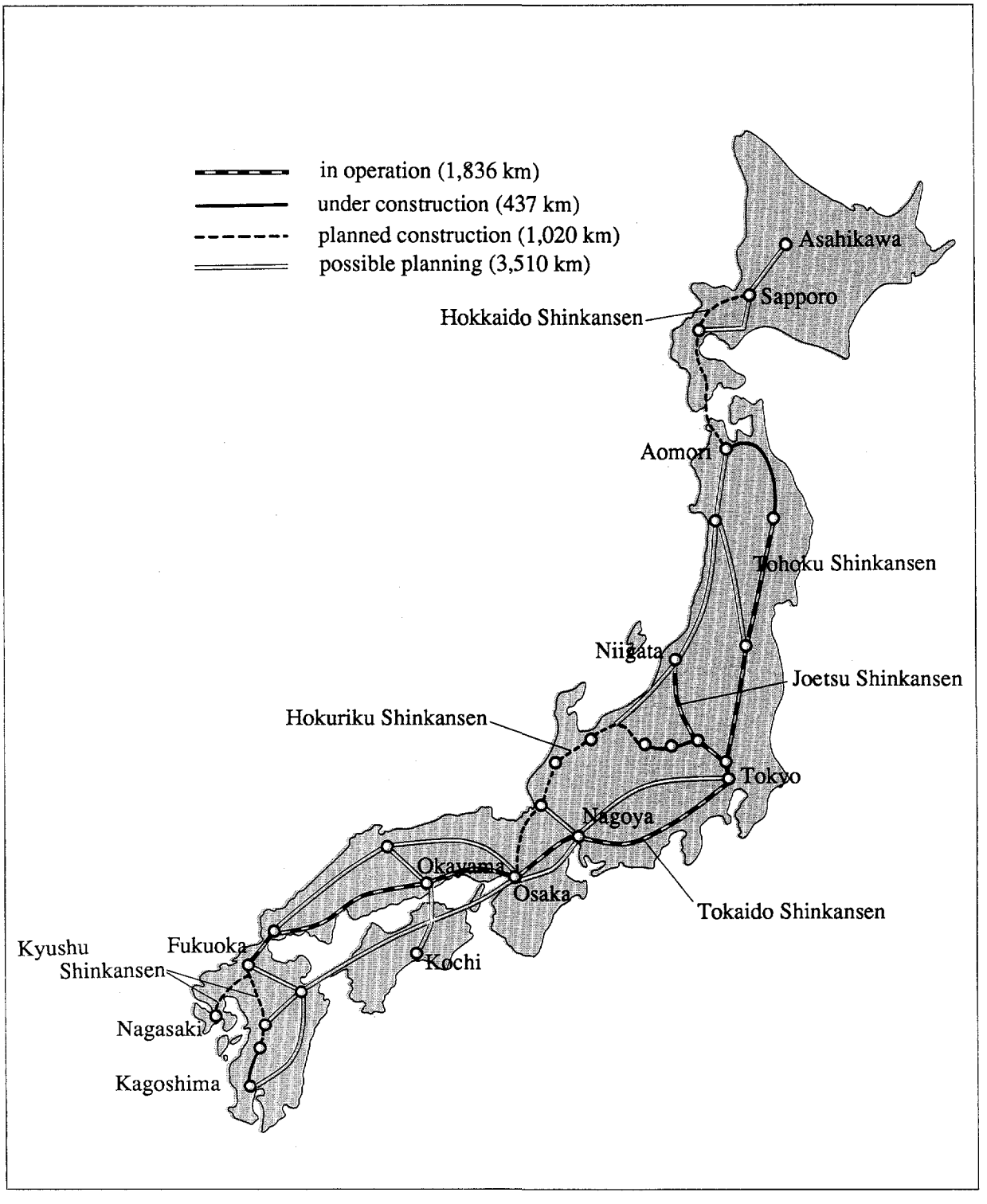


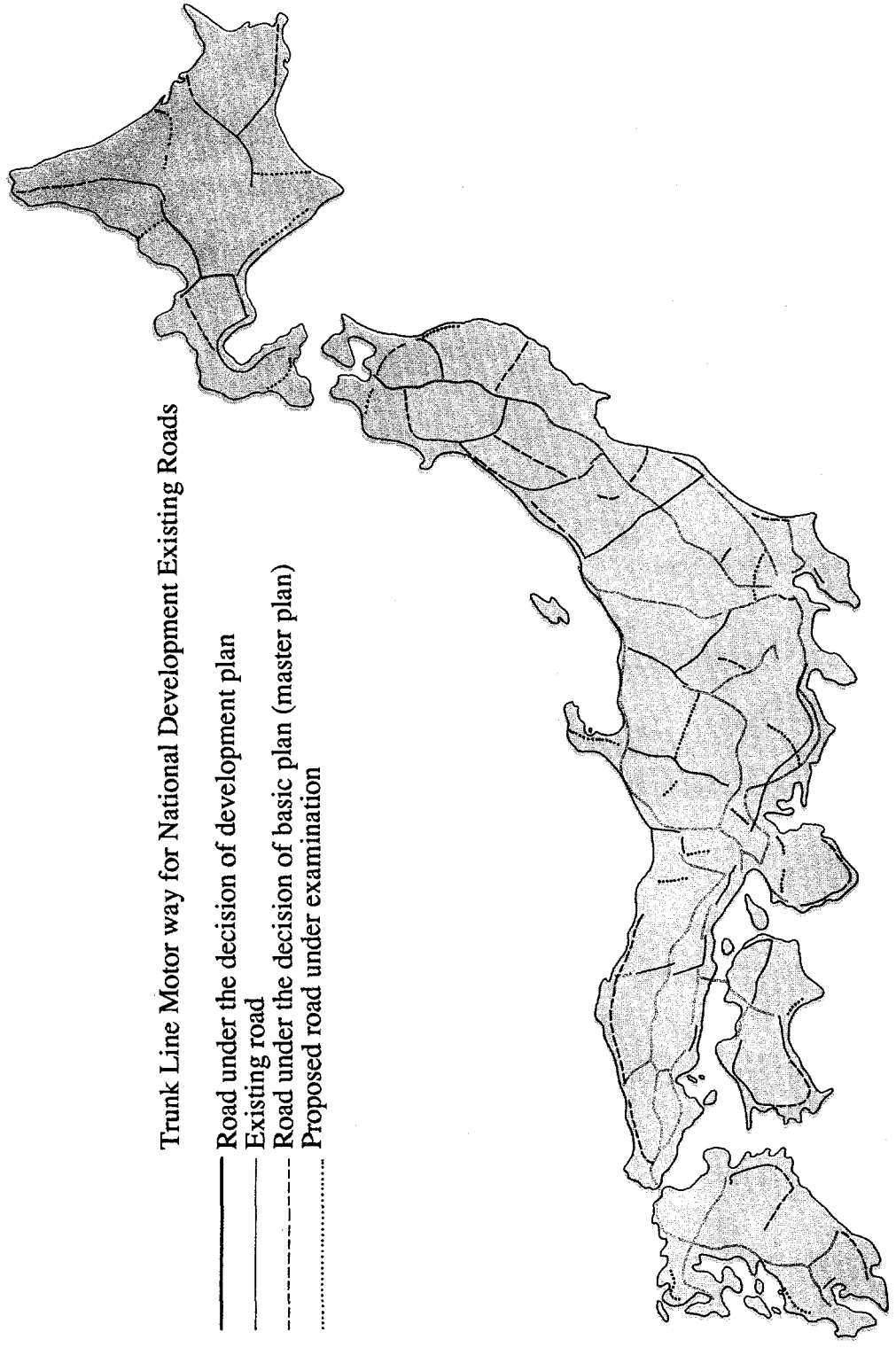
Figure A-3-1: Shinkansen Railway Network

Source: MITI (as of October 1991)

Note:

Both railroads and trunk rods had already been constructed along the subsequent Shinkansen and highway routes prior to the high growth period.

Figure A-3-2: High Standard Arterial Road Network



Source: MITI (as of October 1991)

Annex 4: Anti-Pollution Activities by Citizens' Groups 1890-1975

Year	Events
1890	■ Residents of Agatsuma-mura, Tochigi prefecture, petition the governor to ban operation of the Ashio copper Mine.
1893	■ Residents of Niihama-mura, Ehime prefecture, complain of damage to farm products form sulfur dioxide from the copper refinery of Besshi Copper Mine; they ask its Niihama office to suspend refining operations.
1896	■ Farmers in the Ashio mine pollution area present a leaflet to the Agriculture and Commerce Minister calling for the suspension of the mining.
1897	■ A federation of antipollution groups, formed by affected farmers of four prefectures along Watarase river, petition the Finance Minister to reduce taxes on contaminated land for an indefinite period.
1908	■ Some 130 fishermen of Hiranuma-cho, Kanagawa prefecture, request an oil company to take measures to preclude crude oil leakages. ■ More than 5,000 farmers of Ochi-gun, Ehime prefecture, hold a meeting to form a federation for eradicating toxic gases from the district. ■ Fishery operations in Zushi, Kanagawa prefecture, lodge, protest with Suzuki Seiyakusho against the discharge of waste water containing starch into a neighboring river.
1911	■ Having become aware of a land reclamation project of the Asano Cement Company to prepare a new cement plant site off a neighboring shore, all the residents of Tajima-mura, Kanagawa prefecture, petition the prefectural government to reject it.
1913	■ Residents of Nakatsu-machi, Gifu prefecture, start a protest movement against Chuo Paper. They complain about the harmful effects of paper production, including the contamination and reduced flow of water as well as indiscriminate deforestation. ■ Residents and Municipal Assembly members of Yokohama unite against the construction of a hydroelectric power plant.
1914	■ Local Osaka representatives complain to the police about stack gas from Sumitomo Rolled Copper Mill and Shimofukushima's Nippon Spinning. They state that the toxic emissions have harmful effects on their health and are soiling appliances and commodities. ■ Farmers of Osaka institute a lawsuit against Osaka Alkali to recover damages for crop damage caused by sulfuric acid fumes and sulfur dioxide emitted by its plaint.
1919	■ Residents of Osaka petition the police to suspend construction of the expansion of the Osaka Electric Light Power Plant.
1920	■ Rice production decreases due to mine pollution from Mitsui's mine in Gifu prefec-

	ture. Agricultural associations in neighboring villages request the mining company to install pollution control equipment.
1937	■ Residents of Kawasaki, disturbed by intensifying air pollution, file a petition bearing some 10,000 signatures with the city office, the Kanagawa prefectural government, and the Interior Ministry. They call for steps against the steadily increasing volume of smoke and soot from a cluster of coastal factories.
1938	■ Farmers of Annaka-machi lodge a complaint with Gunma prefecture saying that they have sustained damage to mulberry fields due to emissions of sulfuric acid fumes and nitrous acid gas from Nippon Zinc, and call for steps to protect the fields.
1941	■ Representatives of towns and villages in Gifu prefecture demand that the Kamioka mining station take steps against mine pollution.
1948	■ In the Jintsu river area of Toyama prefectures, a council is formed to deal with mine pollution damage to agricultural products.
1950	■ A women's group in Tobata city, Fukuoka prefecture, campaign for the improvement of air quality which had become serious due to soot and smoke from the Nippon power plant.
1951	■ A total of 45,000 fishermen living along Saeki Bay, Oita prefecture, launch a vigorous protest campaign against a Saeki plant proposed by Kokusaku Rayon and Pulp.
1958	■ Representatives of the fishing net industry along the Edo river, Tokyo, present to the Edogawa plant of Honshu Paper a demand for the purification of plant effluent.
1963	■ Residents of the Yawata area of Kitakyushu band together against cement dust release by the Yawata plant of Onoda Cement, and open negotiations for damages.
1964	■ In Shizuoka prefecture, a joint council against the construction of a petrochemical complex is established by residents of Numazu, Mishima and Shimizu-cho.
1967	■ In the opening move of the Niigata area Minamata disease trial, victims of mercury poisoning file a damage suit with the Niigata District Court against the Kanose plant. ■ Nine certified victims of Yokkaichi pollen file a damage suit against six companies in the petrochemical industry.
1968	■ The itai-itai case officially starts when 28 patients and surviving family members living along the Jintsu river file a damage suit against the Kamioka mining office of Mitsui Mining and Smelting.
1969	■ In Kumamoto prefecture, Minamata disease patients initiate a suit for damages against Chisso Corporation. ■ Twenty-eight residents around Osaka International Airport, affected by aircraft noise, bring suit against the government for a ban on aircraft take-offs and landings at night as well as for indemnification for excessive noise.
1970	■ A citizens' rally is held at Tagonoura Port in Shizuoka prefecture with the participation of 4,200 residents from the seaside area, calling for the eradication of sludge from

	Suruga Bay.
1972	■ More than 100 farmer victims of cadmium contamination in Annaka city, Gunma prefecture, file a suit for damage against Toho Zinc.
	■ Residents opposing Hokkaido Electric Power's thermoelectric power project institute a lawsuit seeking a ban on the project. this is the first suit based on the concept of the right to a healthy environment as a fundamental human right.
1974	■ A group of 575 residents living along the Shinkansen line in Nagoya brings suit against the JNR demanding indemnity for damages.
	■ An all-Japan meeting of residents' movements against thermoelectric power generation is held to oppose the construction of plants being planned by the nine electric power companies of Japan.
1975	■ A group of 11 certified patients of chronic arsenic poisoning in the Toroku district, Miyazaki prefecture, file suit against Sumitomo Metal Mining, the holder of mining rights for Toroku Mine, seeking indemnification.

Anti-pollution movements until 1950 were suppressed by compensation for the damaged citizens and small-scale improvement measures taken by individual factories. Industries had a strong power with a national policy of industrial promotion and most of the citizens were reconciled to the considerable small compensation. However, these citizens' activities were bases of the anti-pollution movements since 1960s. The case of Ashio Copper Mine including results are described as follows.

1879: Thousands of fish died of discharge from Ashio Copper Mine in Watarase River.

1885: Emission from Ashio Copper Mine damaged the crops in neighboring villages.

1890: Residents of Agatsuma village petition the governor to ban the operation of the mine.

1892: The mine agreed to pay some amount of settlement.

1895: Victims of Ashio Mine pollution signed an agreement with the operators of the mine to settle their dispute for an indemnity less than half the amount of earlier settlements. The agreement included the provisions that "no claims of any sort will be made henceforth." The dire circumstances of the victims compelled them to accept the unfavorable terms.

1897: Some 2,000 victims of mine pollution along the Watrase started on a protest march to Tokyo. The Cabinet decided to set up a committee under the Cabinet to study the pollution.In line with the findings of the Cabinet's mine pollution committee, Tokyo Mining Inspection Office served the mine operators with an order detailing improvements required to treat copper-contaminated effluent and otherwise eliminate pollution at Ashio Copper Mine.

1900: As several thousand victims of Ashio mine pollution made a protest march to Tokyo, they were intercepted by military and police and many leaders of the movement were arrested.

1902: Heavy rain in the Ashio area caused extensive damage. The disaster was due to denuded mountains around the mine.

1904: Some residents of Yanaka village moved to a new settlement accepting Tochigi Prefecture's proposal to take over their land for the damage compensation.

1906: The head of Yanaka village decided arbitrarily to abandon the village.

1907: Yanaka village was taken over by the prefecture, paying the remaining residents only a small sum for the land.

The first anti-pollution movement that made the national government to take measures is the fishermen's intrusion in Honshu Paper Mill in 1958. Thereafter, the residents' movements against the construction of a petrochemical complex in Mishima-Numazu, and patients' movements (Itai-itai disease, Minamata disease), etc., increased the public awareness of pollution and promoted Japanese pollution control measures.

Annex 5: Pollution Problems Discussed in the House of Representatives 1914-1939

Year	Events
1914	■ An inquiry regarding the Ajinomoto production facility at the lower reaches of the Tama river approved by the Kanagawa Prefecture
1915	■ A petition regarding Kosaka Kozan copper poisoning
	■ A petition against the second construction of the Uji river hydroelectric power plant
1916	■ A petition regarding Kosaka Kozan copper poisoning
1917	■ An inquiry concerning the depletion of a water supply source (an hydroelectric power project, which uses water from Lake Kasai in the Yamanashi Prefecture, by Katsuragawa Electric Power, Co.)
	■ A petition regarding Kosaka Kozan copper poisoning
1918	■ An inquiry regarding reclamation (a reclamation plan of about 0.325 million m2), ranging from Takanawaminamimachi, Shiba-ku, Tokyo to Omori-machi, Ehara-gun
1919	■ An inquiry regarding damage caused by coal mining
1920	An inquiry regarding damage due to mining, reiterating the inquiry of 1919
1921	■ A recommendation regarding remedies for farmland affected by mining operations
1923	■ An inquiry regarding smoke protection and enrichment of water supply sources (reduction in poisonous smoke emission at the Ashio Dozan and devastation of water supply source in the Watarase-river)
	■ A recommendation for establishing the law which enhances marine product and production facilities
1927	■ An inquiry regarding enrichment of a water supply source (protection forest)
	■ A recommendation regarding smoke poisoning protection and enrichment of water supply source (the Ashio Dozan smoke poisoning problem)
	■ An inquiry regarding an execution of high barrage construction at the Sho river in Toyama Prefecture
1928	■ An inquiry regarding the Ashio Dozan copper poisoning
1929	■ An inquiry regarding the Ashio Dozan copper poisoning (three times)
	■ An inquiry regarding the lake Inawashiro whose water level decreased (an hydroelectric power plant of Tokyo Dento Co.)
	■ A recommendation regarding smoke poisoning protection and enrichment of water supply source (the Ashio Dozan smoke poisoning problem)
1930	■ An inquiry regarding establishment of a research committee on Ashio Kozan smoke control
	■ An inquiry regarding permission for the hydroelectric power plant at the Sho river
1931	■ An inquiry regarding Ashio Dozan copper smoke poisoning (twice)

1932	■ An inquiry regarding Ashio Dozan copper poisoning and smoke poisoning
1933	■ An inquiry regarding Ashio Dozan copper poisoning problem (twice)
	■ A recommendation for subsidizing the restoration of depressed land due to mining (in Fukuoka Prefecture, damage due to coal mining)
	■ A recommendation for remodeling a fish ladder in the Shinano river
	■ A recommendation regarding a subsidy for protecting an extension of fisheries in the Kido river (decline of fishery due to hydroelectric power, Nikko mine, and a barrage for irrigation)
	■ A recommendation for establishing the Water Pollution Control Law
	■ A recommendation regarding preventive monitoring for Ashio Dozan copper smoke poisoning
	■ A recommendation regarding an amendment of the Mining Law
1934	■ An inquiry regarding the Ashio Dozan copper poisoning
	■ A recommendation for establishing a restoration committee on damage due to coal mining
	■ A recommendation for remodeling a fish ladder in the Shinano river (damage caused by a diversion of the Shinano river and the construction of a fixed barrage at the estuary)
	■ A recommendation regarding a subsidy for protecting an extension of fisheries in the Kido river (same as 1933)
1935	■ An inquiry regarding the Ashio Dozan copper poisoning
1936	■ A recommendation for facilitating a restoration committee on damage due to coal mining
1937	■ A recommendation for establishing the Water Pollution Control Law
	■ An inquiry regarding the removal of environmental problems associated with factory in a village
1938	■ An amendment of the Mining Law
	■ A petition regarding removal of poisoned waste water discharged from a factory
1939	■ A petition regarding water pollution control
	■ A petition regarding a subsidy for restoring farmland damaged by mining

Annex 6: Pollution Control Measures Taken by the Tokyo Municipal Government in the Post-War Years

(1) The Tokyo government introduced the Tokyo Municipal Factory Pollution Prevention Ordinance in 1949. This was the first pollution regulation at the local level. Subsequently, Osaka in 1950, Kanagawa in 1951, Fukuoka in 1955, and Niigata in 1960 established similar ordinances.

(2) This ordinance targeted such things as noise, vibration, particulates, offensive and toxic gases, and waste water. It required that a license should be granted by the governor before building a new factory or extending one, and ordered owners to improve facilities before obtaining a license in case there was a risk of pollution.

(3) The Smoke and Soot Regulatory Ordinance of 1955 was established to prevent soot and smoke due to heating in the buildings (mainly at the center of Tokyo). This ordinance targeted not sulfurous acid gas but visible black smoke. The ordinance the objective of which was to prevent smoke and soot pollution, preserve public health, and cleanup urban environment, stipulated the following:

- A notification system when building a boiler, fire grate or combustion chamber whose area was more than 0.25 square meter;
- Regulation of soot and smoke emission by Ringelman's smoke chart;
- A ban on igniting materials such as rubber, sulphur, pitch leather, waste, etc.;
- Observation by managers and operators at a combustion facility;
- The authority to inspect and warn offenders with regard to the soot and smoke standards; and
- An administrative order to repair and improve a combustion facility or to ban its use temporarily.

(4) The Smoke and Soot Regulatory Committee Ordinance of 1955 developed into the Tokyo Municipal Council Ordinance on urban Pollution Measures of 1960. This was the first council to discuss pollution measures in Japan, and consisted of scholars, administrators, representatives from industry and the public. The council which examined current and alternative countermeasures became a basic tool for creating a policy consensus in Japan, and has continued to play an important role in pollution control.

(5) The area system also started to play an important role in pollution control at its time. This system was based on the City Planning Law and the Building Standard Law. Although the Tokyo government had not yet designated a special area for industry, it designated seven kinds of area such as those for industry; sub-industry; second special area for industry, commercial; residential; first and second school area; and special area for residence. It prevented the mixing of factories into residential or commercial areas. However, this system could not enforce the transfer of the existing factories. This had to wait for the construction of collective facilities and the relocation of factories by the Environmental Pollution Control Service Corporation.

(6) Prefectural and city governments began to conduct a research on the impact of environmental pollution on public health. Research on the quantity of soot started around 1930. They also have conducted a research on air quality and air pollution control technology. The adaption of Ringelman's smoke chart was based on

the European and American researches. The result of research on the actual pollution condition helped the administrations to make a decision.

(7) Most of large cities strengthened the administrative structure for pollution control before the Basic Law for Environmental Pollution Control was enacted. Until 1960, in the Tokyo government, the building equipment division of the building guidance bureau was responsible for the Municipal Factory Pollution Control Ordinance, the public health division of the sanitation bureau was in charge of noise, soot and smoke (except soot and smoke from factories), and the agriculture and forestry division of the economic bureau (in order to protect fishery) had authority with regard to water pollution. These responsibilities were merged into the newly established urban pollution division of the capital improvement bureau in 1960. The administrative structure including the health research function was more adequate at the city than at the national level at this time.

Annex 7: Evolution of Urban Sanitation & Pollution Problems and Measures Prior to 1970

Year	Urban sanitation/ pollution problems	Social problems	Measures taken by government
1949	- Frequency of epidemic in big cities - Deterioration of sanitary condition due to inflow of the poor into urban areas - Frequent industrial pollution under the policy for wealth and military strength of the country - Severe damage by land subsidence in industrial areas - Frequency of pollution mainly air pollution	- Epidemics became a social problem - Some anti-pollution movements were neglected and pollution problems did not become social problems - Pollution was recognized only by residents around the factories	- The collection/disposal system of waste/night soil existed from old times was developed - Establishment of hygienic laboratories in big cities - Development of water supply system - "Regulation for the control of factories" was issued in Osaka in 1896(designation of restricted areas and permission for location of industry) - "Industry Law "empowered inspectors of factories in local police stations to control pollution, but actually to give factories slight guidance - "Regulations for Industrial Pollution Control" was enacted in Tokyo in 1949
1950-1959	- Deterioration of the environment of waste disposal sites and expansion of impacts - Seriousness of industrial pollution caused by dust and exhaust gas -Seriousness of traffic pollution caused by dust and exhaust gas - Dense smog covered Tokyo - Victims of Minamata disease were found - Victims of SMON disease(medicine poisoning) were found	- Citizen's movement against construction of waste disposal sites/incinerators - Increase of citizen's complaints against pollution to governments - Many dead foulsmelingfish were found - Fishermen of Tokyo Bay staged a demonstration to Honshu Paper's plant against its discharges	- "Regulation for Pollution Control forBusiness Establishments" in Osaka was enacted in 1950 - "Regulations for Pollution Control" were enacted in Kanagawa(in 1951) and Fukuoka(in 1955) - Tokyo instituted "Smoke and soot Prevention Ordinance" in 1955 - Kumamoto Universitry's researchers concluded that Minamata disease is caused by organic mercury
1960-1969	- Severe industrial pollution throughout Japan (water pollution by effluent from paper plants, Minamata disease in Niigata and Itai-Itai disease) - Thalidomide babies (damaged by medicines) - Victims of the rice- bran oil produced by Kanemi Soko (food Pollution)	- Severe damage by flood in the areas with land subsidence - Law suits against damages by pollution, such as Minamata disease, Itai-itai disease and Yokkaichi asthma, were raised - Development of role of mass media for reporting pollution problems - Expansion of the movements against chemical complex - Health damages by medicines and foods - Noise pollution from Tokaido shinkansen(bullet train)	- Establishment of "Pollution Control Office" in MITI in 1963 - "Environmental Pollution Office"was created within the Environmental Sanitation Bureau of the Ministry of Health and Welfare in 1964 - "Industrial Pollution Control Committee" was set up within Council for Industrial Structure - "Special Committee for Industrial Pollution Control in the Diet - Japan Environment Corporation was created in 1965 - Beginning of development of national legal system for pollution control by setup of Basic Law for Environmental Pollution Control in 1967 - "Air Pollution Control Law" was enacted in 1968 - "The Law concerning Special Measures for the Relief of Pollution related Patients" was enacted in 1969

Annex 8: Case Studies in Government Decision Making: Evolution of The Basic Law for Environmental Pollution Control 1967, and Revision of NO_2 Standards, 1978

The Basic Law for Environmental Pollution Control.

In the 1960s, serious pollution-related health damage due to Minamata Disease, Itai Itai Disease and Yokkaichi asthma became a social issue and the protest movement against the construction of new industrial complex started to become widespread. It was from 1967 to 1969 that the four major pollution lawsuits were filed, and which contributed to the establishment of the Environment Agency in 1971. In 1963, the MITI set up the Industrial Pollution Department. The Industrial Structure Council (the supreme council agency which advises government on the nation's industrial policies) set up the industrial pollution section and started examining how to deal with the pollution from the viewpoint of industrial measures. In the following year, the Ministry of Health and Welfare set up the pollution department and started examining the system to intensify industrial pollution measures from the viewpoint of public health.The Kurokawa Investigation Group, in cooperation with the MITI and the Ministry of Health and Welfare, proposed general measures including low-sulfurization, the spread of high-rise chimneys, the improvement of facilities for pollution control, and the establishment of industrial estates, which had a major impact on subsequent measures to address industrial pollution. Upon receiving this report, the Minister of Health and Welfare agreed that anti-pollution measures must be developed by setting up the Basic Law for Environmental Pollution Control. The Ministry of Health and Welfare revised the law in 1965 to set up a Pollution Council in order to deliberate basic measures concerning pollution. The Ministry took a leadership role in examining these basic measures from the standpoint of public citizens' health and welfare, but other authorities blamed the Ministry by saying that it had exceeded its authority. However, agreement was reached among them by confirming that the adjustment and opinion on the part of authorities can be reflected even after the Council submits a report.

In 1966, the Pollution Council, comprised of distinguished people from various fields such as law, economics, medicine, public health and sociology, submitted a report on basic measures to the Minister of Health and Welfare after one year of deliberation and hearing what people from the business world and other areas had to say.

Generally, the authorities concerned (in this case, the Ministry of Health and Welfare) present the matters required to be deliberated to this kind of Council. Its aim is to avoid getting a report difficult to handle with on the part of administration and to obtain the report based on the proposals conceived by the authorities. The system is such that the administrations draw up and prepare the original plan mainly to be deliberated.

Some of the matters deliberated in this case were as follows:

- Concept of Pollution
- What are Basic Measures?
- Responsibility and Role of the National Government, Local Public Organizations, Enter-prises and Residents

- Environmental Standards
- Dispute Disposal and Relief
- Principle of Bearing of the Cost Concerning Pollution Prevention
- Regional Plan for Pollution Control
- Harmony with the Economy
- Administrative System

After obtaining a report covering these matters from the Council, the Ministry of Health and Welfare decided on the framework of contents to be incorporated in the Basic Law for Pollution.

The Ministry of Health and Welfare then drew up a summary of the experimental plan concerning the Basic Law on Pollution. At first, the authorities concerned did not deal with it actively, but as a result of the forcible instruction of the then Prime Minister, backed by strong public opinion, it was addressed in the Anti-Pollution Measure Promotion Meeting composed of the Prime Minister's Office and Vice-Minister of 14 authorities concerned and was then decided in the Cabinet Council. Negotiations were made from a narrow viewpoint of the authorities concerned but at the same time, the experimental plan was adjusted to reflect a wider viewpoint to institute the basic measures against pollution.

Agreed upon in the Cabinet Meeting, this summary plan was announced officially in 1967. Those in charge of the law in each authority dealt with its enactment. Legislative examination by the Cabinet Legislation Bureau was carried forward in the presence of all the authorities concerned though promoted mainly by the Ministry of Health and Welfare. In the meantime, the opinions and the statements were presented by the press, the business world and other organizations.

Industrial and commercial interests suggested that the competent Ministry be the Economic Planning Agency instead of the Ministry of Health and Welfare. So it was agreed upon that although the competent Minister is the Minister of Health and Welfare, other Ministers should also serve. The Anti-pollution Measure Meeting and the Anti-Pollution Measure Council and the like were set up in the Prime Minister's Office instead of the Ministry of Health and Welfare, but general affairs were handled in that Ministry.

The enacted bill was negotiated between the government and the LDP, the ruling party, mainly in the Anti-Pollution Measure Sectional Meeting. In this process, the following changes were made from the original experimental plan of the Ministry of Health and Welfare, as follows:

- The statement that the maintenance of the people's health and welfare takes priority over the pursuit of profit in projects or other economic activities was deleted as the purpose of the law. In its place was substituted the statement that the people's health should be protected from pollution and the living environment and public welfare should be maintained in harmony with the sound development of economy. (It was confirmed that human health should be considered separately from the harmony with economy.)

- Referring to environmental or ambient standards, the wording was changed from "standards must be maintained" to "it is desirable that standards should be maintained".

- The statement "The environmental standard must be decided based upon the best scientific viewpoint at the time even without complete scientific proof and must be revised by exercising appropriate scientific judgment." was deleted.

In this way the Basic Law for Environmental Pollution Control was presented to the Diet as the government's bill in 1967. In the following deliberation the opposition parties requested that the environmental standard should be a tolerable one and also asked for the institution of no-fault liability, the unification of pollution-related administrations, and the deletion of the "harmony with economy" clause. The Basic Law was designed after going through this deliberation and the joint modification of the following items were made by both parties in July:

- The stipulation of the item that "the harmony with economy" clause does not apply to the protection of the people's health.

- The restoration of the clause to review the environmental standard (the part deleted in time of the enactment).

- The stricter requirement that the government must take action to establish the system for disputes and relief.

- An additional clause that enables local governments to set up Pollution Control Councils.

- The obligation for the government to submit to the Diet an annual report concerning pollution control.

The general responsibilities that were primarily allocated to the Ministry of Health and Welfare have now been taken over by the Environment Agency since its establishment in 1971, and these have been carried out in a similar way according to the provisions of the Basic Law.

Revision of NO_2 Standards, 1978

Negotiations between the government and industry in setting up the environmental standard for NO_2 is a good example of industrial participation in the decision making process.

The environmental standard for NO_2 was established in 1973 as "Daily average of below 0.02 ppm". In the process of its establishment, it was opposed strongly by industry in terms of its scope and technical feasibility.

Although the required experiments on animals and immunological survey in the contaminated areas were insufficient to set the environmental standards in 1973, establishment of standards was critical to prevent serious damage-causing pollution such as at experienced in Yokkaichi City. Therefore, the above standard, submitted to the Specialized Committee of Pollution Control Council, based on immunological data in Yokkaichi and the result of the test on animals, was accepted in its entirety.

The standard was ranked the most strict in the world, and the scientific grounds for its establishment were frequently called into question in Japan and overseas.

Japanese industry led by the steel, chemical, electric power, and automobile manufactures

who bore the huge cost of pollution control, reviewed the scientific grounds for the standard, the improvement program by the stricter effluent control, the amount of funds required to control effluent, and the prospect for technical development. This review was based upon international comparison of standards and technologies, and monitoring techniques. They finally urged the establishment of an environmental standard in accordance with their views, via the Environment Agency and the MITI in 1978.

The case for revision was led by the steel industry who considered the scientific ground in relation with health damage as irrational. Their up-to-date steel factory, which was still facing law suits, incurred pollution control costs of nearly 5% of the production cost: adhering to the standard would increase these costs by a further 4% of production cost.

Industrialists expressed this concern at the International Symposium focusing on the effect of NO_2 on human health in 1975. Following pressure from industry, the MITI referred the measure to control NOx to the Industrial Pollution Section of Industrial Structure Council in 1976, with a request that the standard be reviewed.

During this process, industry presented to the administration evidence on various techniques, the costs involved and the impact on human health.

The Environmental Agency refereed affairs concerning the scientific judgment for the influence of NO_2 on human health and the judging standard to the Central Pollution Control Council in 1977. The Specialized Committee recommended as a guideline an annual average of 0.03-0.02 ppm in 1978. Industry criticized this proposal severely, and insisted the annual average of 0.05 ppm as in the U.S.

This revision was severely censured by the residents for ignoring the impact on human health, and was picked up in the Diet as a major topic. The Industrial Structure Council of MITI insisted on the daily average of 0.05 ppm (equivalent to the yearly average of 0.025 ppm) as the industrial world did and on 0.04 ppm as an absolute maximum.

The revision resulted in the conclusion that "a daily average of hourly figures must be below or between 0.04 ppm-0.06 ppm". This revision was made based on a various epidemiological researches and overseas investigation results for five years since 1973. Also MITI and Environment Agency implemented the revision, supported by continuous investments in pollution control by the industrial world, as administrative judgement within reasonable interpretation of available scientific data. During the long debates, the industrial world accumulated knowledge actively and prepared the basic data for relaxation of the existing standards. The business world's participation in this revision illustrated here is a typical example of how they become involved in the government's pollution-related policies.

The Basic Law for Environmental Pollution Control.

Law No. 132, 1967

Amended by law No. 132,1970
No. 88,1971
No. 111,1973
No. 84,1974
No. 78,1983

Chapter 1. General Provisions

(Purpose)
Article 1

In view of the vital importance of environmental pollution control for the preservation of a healthy and civilized life for the nation, this Law is enacted for the purpose of identifying the responsibilities of the enterprise, the State and the local government bodies with regard to environmental pollution control and of determining the fundamental requirements for control measures, in order to promote comprehensive policies to combat environmental pollution thereby ensuring the protection of the people's health and the conservation of their living environment.

(Definition)
Article 2

1. The term "environmental pollution," as used in this Law, shall mean any situation in which human health and the living environment are damaged by air pollution, water pollution(including the deterioration of the quality and other conditions of water as well as of the beds of rivers, lakes, the sea and other bodies of water. The same shall apply hereinafter, except in the case of Paragraph 1, Article 9), soil pollution, noise, vibration,ground subsidence (except for subsidence caused by drilling activities for mining.This exception shall apply hereinafter), and offensive odors, which arise over a considerable area as a result of industrial or other human activities.

2. The term "living environment," as used in this Law, shall include property closely related to human life, and animals and plants closely related to human life and the environment in which such animals and plants live.

(Responsibility of the enterprise)
Article 3

1. The enterprise shall be responsible for taking the measures necessary for the prevention of environmental pollution, such as the treatment or disposal of smoke and soot polluted water, wastes, etc. resulting from its industrial activities, and for cooperation with the State and local government bodies in their efforts to prevent environmental pollution.

2. The enterprise, in manufacturing and processing activities, shall endeavor to take precautionary measures to prevent environmental pollution which might otherwise by caused by the use of the products which it manufactures or processes.

(Responsibility of the State)
Article 4

The State has the responsibility to establish fundamental and comprehensive policies for environmental pollution control and to implement them, in view of the fact that it has the

duty to protect the people's health and conserve the living environment.

(Responsibility of local government bodies)
Article 5

In order to protect the health of the local population and to conserve the living environment, local government bodies shall take measures in line with the policy of the State and shall also work out and implement appropriate measures for environmental pollution control which take into account the specific natural and social condition of the area concerned.

(Responsibility of citizens)
Article 6

Citizens shall endeavor to contribute to the prevention of environmental pollution in all appropriate ways such as cooperating with the State and with local government bodies in the implementation of control measures.

(Annual report, etc.)
Article 7

1. ■ The Government shall present to the Diet an annual report on the situation with regard to environmental pollution and on those measures taken by the Government in order to control it.

2. ■ The Government shall present to the Diet annually a document, outlining the measures which the Government is going to take to deal with the environmental pollution situation described in the report referred to in the preceding paragraph.

(Control of air pollution, etc. caused by radioactive substances)
Article 8

With regard to measures for the control of the pollution of air, water and soil by radioactive substances, the Atomic Energy Fundamental Law (Law No. 186,1955) and other related laws shall apply.

Chapter 2. Fundamental policies for Environmental pollution Control

■(1) Environmental quality standards
Article 9

1. ■ With regard to environmental conditions relating to air, water and soil pollution and noise, the Government shall establish environmental quality standards, the maintenance of which is desirable for the protection of human health and the conservation of the living environment.

2. ■ In the event that one of the standards referred to in the preceding paragraph establishes more than one category and stipulates that land areas or areas of water to which those categories are to be applied should be designated, the Government may delegate to the prefectural governors concerned the authority to designate those land areas or areas of water.

3. ■ With regard to the standards provided for in Paragraph 1, due scientific consideration shall always be given and such standards shall be revised whenever necessary.

4. ■ The Government shall make efforts to ensure the maintenance of the above-mentioned standards, by implementing environmental pollution control measures in a comprehensive, effective and appropriate manner.

■ (2) Measures to be taken by the State

(Emission control, etc.)
Article 10

1. ■ In order to control environmental pollution, the Government shall take measures for the control of the emission of pollutants responsible for air, water and soil pollution, establishing standards to be observed by the enterprise.

2. ■ In order to control environmental pollution, the Government shall endeavor to take measures to deal with noise, vibration, ground subsidence and offensive odors, in a manner similar to that referred to in the preceding paragraph.

(Control of land use and installation of facilities)
Article 11

In order to control environmental pollution, the Government shall take necessary measures with regard to land use and shall, in areas where environmental pollution is serious or likely to become serious, also take measures to control the installation of facilities which cause environmental pollution.

(Promotion of establishment of facilities for the prevention of environmental pollution)
Article 12

The Government shall take measures to promote necessary projects for the prevention of environmental pollution, such as the establishment of buffer zones, etc., as well as those projects to establish public facilities which will contribute to the prevention of environmental pollution, such as sewerage and public waste disposal plants.

(Establishment of surveillance and monitoring systems)
Article 13

The Government shall endeavor to establish systems for surveillance, monitoring, measurement, examination and inspection in order to ascertain what the situation with regard to environmental pollution is and to ensure adequate enforcement of measures to combat environmental pollution.

(Carrying out of surveys and investigations)
Article 14

The Government shall carry out surveys and investigations necessary for the planning of measures for environmental pollution control, such as those for predicting environmental pollution trends.

(Promotion of science and technology)
Article 15

In order to promote the development of science and technology which will contribute to the prevention of environmental pollution, the Government shall take the necessary measures such as the consolidation of survey and research systems, the promotion of research and development, the dissemination of the results of such research and development work, and the education and training of research experts.

(Dissemination of knowledge and information)
Article 16

The Government shall endeavor to disseminate knowledge and information concerning environmental pollution and also to make the nation

more conscious of the need to prevent environmental pollution.

(Consideration of environmental pollution control in the planning of regional development policies, etc.)
Article 17-1

The Government shall take into consideration the need to control environmental pollution in the planning and implementation of regional development measures such as those for urban development and the construction of factories.

(Protection of the natural environment)
Article 17-2

In order to contribute to the prevention of environmental pollution, the Government shall, in conjunction with other measures prescribed in this Section, endeavor to protect the natural environment as well as to conserve green areas.

(3) Measures to be taken by local government bodies

Article 18

The local government bodies shall, provided that the measures do not infringe laws and regulations, take measures in line with the policy of the State provided for in the preceding Section and shall also implement measures for environmental pollution control which take into account the specific natural and social conditions of the area concerned. In this case, the prefectural governments shall be responsible mainly for the implementation of measures covering wide areas and also for the coordination of measures to be taken by the municipal governments.

(4) Environmental pollution control in specified areas

(Formulation of environmental pollution control programs)
Article 19

1. The Prime Minister shall instruct the prefectural governors concerned to formulate programs relating to the environmental pollution control measures (hereinafter called "Environmental Pollution Control Programs") to be implemented in specific areas which fall into any one of the following categories, by showing to those governors fundamental policies for such programs:

(1) areas in which environmental pollution is serious and in which it is recognized that it will be extremely difficult to achieve effective environmental pollution control unless comprehensive control measures are taken;

(2) areas in which environmental pollution is likely to become serious on

account of rapidly increasing concentrations of population, industry, etc., and in which it is recognized that it will be extremely difficult to achieve effective environmental pollution control unless comprehensive control measures are taken.

2. When the prefectural governor concerned has received the instruction referred to in the preceding paragraph, he shall draw up an Environmental Pollution Control Program in accordance with the fundamental policies referred to in the preceding paragraph and shall submit it to the Prime Minister for his approval.

3. Prior to issuing an instruction under Paragraph 1 or giving the approval required under the preceding paragraph, the Prime Minister

shall consult with the Conference on Environmental Pollution Control.

4. ■ Prior to issuing an instruction under Paragraph 1, the Prime Minister shall seek the opinion of the prefectural governor concerned.

(Implementation of environmental pollution control programs)
Article 20

The State and local government bodies shall endeavor to take measures necessary for the full implementation of Environmental Pollution Control Programs.

■ (5) Settlement of disputes relating to environmental pollution and relief for damage caused thereby.

Article 21

1. ■ The Government shall take the measures necessary to establish a system for the settlement, by such means as mediation and arbitration, of disputes which arise in connection with environmental pollution.

2. ■ The Government shall take the measures necessary to establish a system which will make possible the efficient implementation of relief measures for damage caused by environmental pollution.

Chapter 3. Bearing of Costs and Financial Measures

Article 22

1. ■ The enterprise shall bear all or part of the necessary cost of the works carried out by the State or local government bodies to control environmental pollution arising from the industrial activities of such enterprise.

2. ■ The nature and amount of the costs which the enterprise shall bear under preceding paragraph, the enterprises which shall bear such costs, the method of calculation of the amount to be borne by such enterprises, and other necessary matters relating to the bearing of costs shall be laid down in other laws.

(Financial measures for local government bodies)
Article 23

The State shall endeavor to take necessary financial and other measures relating to the necessary cost of environmental pollution control measures implemented by local government bodies.

(Assistance to the enterprise)
Article 24

1. ■ The State and local government bodies shall endeavor to take the necessary measures, such as monetary and taxation measures, to encourage the installation and improvement, by the enterprise, of facilities for the prevention of environmental pollution.

2. ■ In taking the measures referred to in the preceding paragraph, special consideration shall be given to the small and medium enterprise.

Chapter 4. The Conference on Environmental Pollution Control and the Councils on Environmental Pollution Control

■ (1) The conference on environmental pollution control

(Establishment and functions)
Article 25

1. ■ There is hereby established a Conference on Environmental Pollution Control(hereinafter called "the Conference") as a specific organization attached to the Prime Minister's Office.

2. ■ The Conference shall perform the following functions.It shall;

■(1) deal with matters provided for in Paragraph 3, Article 19, with respect to the Environmental Pollution Control Programs;

■(2) in addition to performing the function referred to in the preceding sub-paragraph, deliberate on basic and comprehensive measures for environmental pollution control, and promote the implementation of such measures;

■(3) in addition to performing the functions referred to in the preceding two subparagraphs, deal with matters which come within the jurisdiction of the Conference under laws and regulations.

(Organization, etc.)
Article 26

1. ■ The Conference shall be composed of a Chairman and Members.

2. ■ The Prime Minister shall hold the office of Chairman.

3. ■ Members shall be appointed by the Prime Minister from among the heads of related Ministries and Agencies.

4. ■ There shall be Secretaries of the Conference.

5. ■ The Secretaries shall be appointed by the Prime Minister from among the officials of related Ministries and Agencies

6. ■ The Secretaries shall assist the Chairman and Members in dealing with the matters which come within the jurisdiction of the Conference.

7. ■ The secretarial affairs of the Conference shall be handled by the Environment Agency.

8. ■ Matters necessary for the organization and operation of the Conference, other than those provided for in the preceding paragraphs, shall be provided by Cabinet Orders.

■ (2) Councils on environmental pollution control

(Organization and functions of the central council on environmental Pollution control)
Article 27

1. ■ There is hereby established a Central Council on Environmental Pollution control (hereinafter called "the Central Council")

2. ■ The Central Council shall perform the following functions. It shall;

■(1) Study and deliberate on basic matters related to environmental pollution control, when requested to do so by the Prime Minister;

■(2) in addition to performing the function referred to in the preceding sub-paragraph, deal with matters which come within the jurisdiction of the Central Council under 1 laws and regulations.

3. ■ The Central Council may express its opinion to the Prime Minister with regard to matters provided for in the preceding paragraph.

Article 28
1. ■ The Central Council shall be composed of not more than 90 members.

2. ■ The members shall be appointed by the Prime Minister from among those experts who have both knowledge and experience in environmental; pollution control.

3. ■ The members shall serve on a part-time basis.

4. ■ Matters necessary for the organization and operation of the Central Council, other than those provided for in the preceding paragraphs, shall be provided for by Cabinet Orders.

(Prefectural councils on environmental pollution control)
Article 29

1. ■ The prefectural governments shall establish Prefectural Councils on Environmental Pollution Control which shall perform such functions as the study of and deliberation on basic matters relating to control measures for environmental pollution within the prefectures concerned.

2. ■ Matters necessary for the organization and operation of the Prefectural Councils on Environmental Pollution Control shall be provided for by prefectural ordinances.

(Municipal Councils on Environmental Pollution Control)
Article 30

Municipal governments may, under the provisions of relevant municipal ordinances, establish Municipal Councils on Environmental Pollution Control which shall perform such functions as the study of and deliberation on basic matters relating to control measures for environmental pollution within the municipalities concerned.

Annex 9A: Amended Articles in The Basic Law for Environmental Pollution Control

The basic Law for Environmental Pollution Control was enacted in 1967 and has been amended several times. Following are the deleted, amended or subsequently inserted articles in the original law.

Deleted articles

The following articles refer to the balance with sound economic development were deleted. This deletion means that environmental conservation and pollution control are given priority over economic development.

Article 1-2 ■ Sound economic development should be kept in balance with the conservation of the living environment under the preceding paragraph.

Article 8-2 ■ Upon prescribing environmental quality standards, the balance with sound economic development should be taken into account.

Inserted articles

Article 9-2 ■ In case the standards under the preceding paragraph are prescribed in establishing two or more categories, and the land area or water area applicable to applied those categories are designated, the Central Government may entrust the designation of the land area or water area to the Prefectural Governor.

Article 17-2 ■ The Government must endeavor to protect the natural environment such as the conservation of green areas so as to contribute to pollution control, in conjunction with other policies and the measures as prescribed in this Section.

Investigation and deliberation of matters concerning countermeasures for environmental pollution was added as the function of the Central Council on Environmental Pollution Control, as follows;

Article 27-2.2 ■ (The Council) shall be in charge of investigating important matters concerning countermeasures to environmental pollution, in compliance with inquiries or other Minister of the Environmental Agency of the Ministers concerned.

Amended articles

Article 29-2 originally stated that "the local government may establish the Local Council on Environmental Pollution Control according to the prescription of ordinance, in order to have the council investigate and deliberate basic matters concerning the pollution control countermeasures in the local area". This article is divided into articles 29-1, 29-2 and 30, which prescribe in more detail the establishment of the Prefectural Council.

Article 29 ■ Prefectural governments shall establish Prefectural Councils on Environmental Pollution Control, in order to have the council to investigate and deliberate the basic matters concerning pollution control countermeasures in those prefectures.

Article 29-2 ■ Matters necessary for organization and management of the Council shall be prescribed by the prefectural ordinances.

Article 30 ■ Municipal governments may establish Municipal Councils on Environmental Pollution Control, in order to have the council investigate and deliberate basic matters concerning pollution control countermeasures in those cities.

Other minor amendments

Other than the amended articles described above, some minor amendments were made as follows;

In Article 2: Concerning water pollution mentioned in this article, a note was attached that the water quality pollution includes the deterioration of water conditions other than the water quality and the the soil quality of the water bottom

In Article 3: Concerning pollution mentioned in this article, illustrative description of smoke and soot, polluted water and solid waste was attached prior to the word "pollution".

In Article 12: Concerning public facilities contributing to pollution control, the example of public treatment facilities for solid waste was inserted.

In Article 26 or other concerned articles:
The Environmental Health Bureau of the Ministry of Health and Welfare was revised as the Environmental Agency because the Environmental Agency was not yet established when the Basic Law for Environmental Pollution Control was originally enacted in 1967.

Niigata Minamata Disease Litigation

The suit was filed in 1967. The lowest court ruled for the plaintiff in 1971.

Background

The Showa synthetic chemical factory (later Showa Denko) started producing acetaldehyde and synthetic acetate in 1936. Carbide residue from waste was discharged into the Agano river in 1959, turned the river white, and killed many fish. Showa Denko then paid the Agano river fishery union association an indemnity. Around 1963 cats owned by fishermen became disoriented and died. In 1964, the first victim of acute and violent type of mercury poisoning died only two months after the outbreak of illness. After this incident, deaths and complaints about pain continued and the illness was diagnosed as organic mercury poisoning. In 1965, Niigata Minamata disease was officially recognized.

After an official announcement, the Ministry of Health and Wealth sent its staff to Niigata to investigate. A liaison council consisting of five related ministries and agencies started to investigate the cause of the poisoning. Niigata prefecture also investigated the cause of organic mercury poisoning, and officially announced that the cause was fish in the Agano river. In 1965, as the results of the MHW's research increasingly indicated that the Kanose factory of Showa Denko was the pollution source, Showa Denko stopped producing acetaldehyde. Additional research on mercury compounds remaining in water moss conducted by the medical department of a university and a special research team in the MHW scientifically proved that this was indeed the pollution source and cause of Niigata Minamata disease.

The "Minamata Disease Countermeasures Council of Niigata Prefecture Democratic Federation" was formed in 1965. Through negotiation, the council required the Niigata prefecture to recognize the municipal responsibility to provide medical treatment expenses or money for medical care, providing milk for mothers and children at risk from the disease, funeral money for the dead, and living expenses for patients. Moreover, the "Meeting of Victims of Niigata Minamata Disease" was organized by the patients and their families. The families filed a compensatory claim with the Niigata District Court in 1967.

Content

Plaintiff:	13 members of 3 families in the first suit, 77 members of the patients and their families by the 8th suit
Defendant:	Showa Denko Corp.
Claim:	The defendant should admit that its factory waste water caused organic mercury poisoning in the Agano river and compensate for damages of the patients and their families.

Main Issues

Since the plaintiff claimed the defendant's liability for illegal actions based on section 709 of the civil law, the plaintiff had to prove the defendant's intention and negligence as well as

a cause-effect relationship. The main points were: whether 1) a source of the contaminated river fish was the factory waste water or agricultural chemicals; 2) the factory was liable for its negligence in preventing the outbreak of Minamata disease; and 3) the plaintiff could uniformly claim all damages.

Judgement

The court determined, by epidemiological analysis, that Minamata disease was caused by consumption of the river fish which were contaminated by effluent from the Showa Denko Kanose factory, and ordered the defendant to pay a total amount of 270 million and 249.8 thousand yen. Although the compensatory amount was less than expected, this judgement was a civil law landmark by recognizing the compensatory liability of the pollution-causing corporations.

Impact

Despite being aware of a precedent for Kumamoto Minamata, the defendant did not analyze the factory effluent, and discharged it into the river without treatment, thereby causing mercury poisoning. This was the defendant's negligence. The judgement commented on a basic corporate attitude toward pollution control, that, as a general principle, there is no justification for sacrificing the citizen's most fundamental rights such as life and health in order to protect corporate profit. The result was that the "economic harmony provision" in the Basic Law for Environmental Pollution Control (before the amendment in 1970) was no longer applicable.

Note

Minamata disease first appeared in cats around Minamata city in Kumamoto Prefecture. Eating contaminated fish, the cat weakened, became disoriented, and eventually died. Minamata disease numbed hands and feet, and caused dizziness in humans. Victims became unable to walk: there behavior became characterized by violence and insanity, and many of them died. Since it followed the Kumamoto Minamata disease, Niigata Minamata is called the second Minamata disease.

Yokkaichi Asthma Litigation

The suit was filed in 1967. The court ruled for the plaintiff in 1972.

Background

Based on the new industrial city policy during high economic growth period after the war, construction of the first industrial complex in Yokkaichi was completed in 1959 and started full-scale operation. By the completion of the third complex in 1972. Its refinery capacity was 0.5 million barrels of oil and 0.7 million tons of ethylene. From the beginning of its operation, citizens complained about asthma. Air pollution peaked around 1962-64 (SO_2 concentration in the Isotsu district was the worst and sometimes exceeded 1 PPM per hour). Although the municipal administration provided health checks and subsidies for medical expenses to the patients who were assumed to suffer pollution-related illness, suicides and deaths of young patients continued. In 1967, the residents in the Isotsu district filed a suit against 6 companies (which constituted one complex) claiming compensation for damages.

Content

Plaintiff:	9 residents of the Isotsu district in Yokkaichi-city
Defendant:	6 companies which constituted one complex
Claim:	The plaintiff insisted that 6 com panies, which, as constituents of one complex, jointly discharged SOx which induced air pollution and asthma among residents in the Isotsu district.

Main Issues

The main issues were to prove a causal relationship between air pollution and asthma, and the six companies' liability for pollution as their joint illegal action. The defendants rebuttal was that they did not have any joint action. They also argued that an independent illegal action of each company had not been established, the cause-effect relationship between asthma and sulfur dioxide was not proven, and that pollution control measures had been taken.

An assistant professor of Osaka City University, as a witness on the plaintiff's side, testified that Yokkaichi pollution was caused by a false plan of regional development and that the companies were liable for the pollution because they did not take sufficient action to control air pollution. In addition, a professor of the medical department at Mie University demonstrated the epidemiological causal-effect relationship between sulfur dioxide concentration and the disease rate.

Judgement

It was proved that the six defendants' factories caused air pollution in Yokkaichi. It was also epidemiologically proved that SO_2 air pollution rapidly increased occlusive lung disease. The court determined that the defendants had a joint relationship, and were thus, liable for the joint illegal action. The court ordered the defendants to jointly pay the total amount 88,210,823 yen.

Since neither the defendants or the plain tiffs appealed, the judgement was officially concluded. Thereafter, approximately 140 vic-

tims started individual negotiations with the 6 companies. The compensatory amounts were set as follows: 10 million yen per death, 6.5 million yen per adult in-patient, 5.5 million yen per adult out-patient, and 3 million yen per a child (the total amount was 569 million yen). Furthermore, the six companies accepted on-site inspections by the residents.

Impact

The judgement determined that epidemiological evidence may be sufficient to prove the cause-effect relationship between disease and air pollution, and that corporations are jointly liable for large scale combined air pollution. Aiming at relieving the victims, the judgement enhanced an anti-pollution concept among residents and had a great impact on not only corporations but also on national and municipal administrations.

Reflecting the judgement of the Yokkaichi litigation, the Minister of the Environment Agency declared a strong willingness to strengthen pollution control and environmental protection measures. At the national level, the "Pollution Health Damage Compensation Law" was established in 1973. The environmental effluent standards for sulfur dioxide became four times as strict as in 1973. Environmental assessment legislation started in 1976. At the local level, Mie prefecture requested 29 large factories in Yokkaichi to reduce the volume of SOx emission by 10-20% from the current base in 1972. Yokkaichi city also decided to expand the area in which victims of pollution related disease could claim compensation.

Note:

Chronic bronchitis, asthma, vesicular emphysema, etc. are some of health problems that arise from air pollution. "Yokkaichi asthma" causes a person to have sudden asthma attacks and respiratory difficulties.

Itai-itai Disease Litigation

The suit was filed in 1968. The lower court ruled for the plaintiff in 1971. The plaintiff won in the appeal court and the decision was finalized.

Background

Around the 1910s, soil acidification, withering of trees, and reduced agricultural productivity due to sulfur dioxide discharged from the Kamioka mining operation of the Mitsui Mining and Smelting Corporation had already become manifest. In 1920, farmers requested protection from damage because rice crops decreased due to mine pollution. Around this time, it is said that a strange disease at the Jintsu river basin, Toyama prefecture, occurred. This disease caused harsh pain and fractures in bones and joints, and eventually caused death. In 1938, mayors of towns and villages, and agricultural and fishery associations at the Jintsu river basin continued to negotiate with the mine. Although Toyama prefecture and the mine provided a sedimentation basin at one time, the war interrupted such actions. In 1950, the "Jintsu river mine pollution countermeasures council" was formed to protect agricultural products from the contamination. Since 1952, the Kamioka mining operation has paid about 3 million yen for damages to seven towns and villages in the river basin. In 1957, a local doctor reported that the cause of this disease was heavy metal contained in effluent from the mine and the disposed sedimentation. Research conducted by this doctor and by a local university identified cadmium as the cause. The patients and their families claimed compensation for damages against Mitsui Mining and Smelting based on section 109 of the Mining Law (established in 1939), which determines that a corporation is liable for compensation with or without its negligence when the mining operation damages someone.

Content

Plaintiff:	31 members in the first court (8 were patients) 489 members by the 7th suit (164 were patients)
Defendant:	Mitsui Metal and Smelting Corporation
Claim	The defendant should admit that cadmium contained in effluent from the mine caused Itai-itai disease and compensate the plaintiffs for damage.

Main Issues

In the provision of the Mining Law, the plaintiffs did not have to prove the defendant's intention or negligence, if they could prove a cause-effect relationship. Therefore, the main issue was proof of the cause-effect relationship, and, if it could be proved, the amount of compensation. After the suit was filed, the Ministry of Health and Welfare announced its view in 1968 that the cause of Itai-itai disease was cadmium discharged from the mine. The complaint was based on this view. The defendant argued that there was no evidence of the cause-effect relationship, and requested the plaintiff to prove the medical causality of the Itai-itai disease.

Judgement

Both the first and the second courts sup-

ported the plaintiff's claim that the main cause of Itai-itai disease was cadmium discharged from the mine, and accepted most of the plaintiff's compensatory claims: 12 million yen for each death, 9.6 million yen per patient, and 20% of the legal costs. Since the mine did not appeal, the decision was finalized. The defendant paid about 2.3 billion yen in compensation for 489 plaintiffs, including the plaintiffs at the second litigation. Furthermore, the court ordered the corporation to enter into an environmental pollution control agreement, which accepted on-site investigations by residents, and to submit a written oath that promised compensation for victims who successfully participated in lawsuits, and corporate responsibility for agricultural damages or soil contamination. The corporation also agreed to finance treatment for patients suffering from Itai-itai disease.

Impact

Since the Mining Law only required the plaintiff to prove a cause-effect relationship in litigation, the court could make an early decision. This decision was a precedent for subsequent pollution litigation. Also, the court's decision adapted a "probability theory" that a corporation should be liable without a 100% proof or a scientifically rigorous examination in cases where a cause-effect relationship between the conduct and the damage is apparent, and where there is no rebuttal to disprove this presumption. This decision greatly influenced later pollution litigation.

Note:

The main symptom of Itai-itai disease is increasingly severe pain in all parts of body, initially affecting bones and joints, and eventually causing death. The term Itai-itai in fact refers to a cry of pain.

Kumamoto Minamata Disease Litigation

The suit was filed in 1969. The plaintiff won the first suit in 1973.

Background

Completing a new factory in 1918, Nihon Chisso Hiryo Corporation (now Chisso Corporation) started producing lime nitrogen. and discharged its untreated waste water into the Minamata Bay. As the waste water contaminated the sea and damaged fishery products, the Minamata fishery union claimed compensation for damages against the factory. The factory paid the union money in exchange for a promise that the union would no longer complain against the factory.

Chisso extended its facilities in 1932 and discharged waste water with mercury into the Shiranui bay, and the fishery problem was then revived. Chisso paid the union about 150 thousand yen as compensation for damages in 1943. However, the polluted area expanded greatly around 1955. An enormous increase in the death of fish, animals and birds was observed. The living environment of the sea and the coastal residents was severely damaged. Human health was also adversely affected. Since the Minamata disease was officially recognized in 1956, Minamata city, Kumamoto prefecture, the Ministry of Health and Welfare, and a number of universities began to analyze the cause of the disease as well as the appropriate treatment measures: both areas were extremely complex.

Chisso, the victims, and their families entered into the "solarium agreement" in 1959 which established amounts of compensation: 300 thousand yen per death and 100 thousand yen for survivor's pension. However, corporate responsibility was not established; the cause of the disease was unknown at this time, and therefore the amount of compensation was low.

However, mercury contamination expanded when Chisso selected other rivers in which it discharged its waste water. Damage to fisheries occurred one after another, and the number of human victims increased. Demonstrations by fishermen and attacks on factories took place. In 1968, the government announced its view that Chisso had been the source of pollution causing the damage. 12 years had passed since the first person had been victimized.

Content

Plaintiff:	112 members of 28 families (victims and their families) in the first suit, 141 members of 31 families including additional suits
Defendant:	Chisso Corporation
Claim:	Chisso Minamata factory should be liable for its negligence and compensate the patients and their families for damage.

Main issues

Since the government had ascertained the cause-effect relationship of the Minamata disease, the issues were whether: 1) Chisso was liable for its negligence; 2) the solarium agreement of 1958 was valid; and 3) a damage theory

was applicable. Testimony from various witnesses, including a confined patient who died 3 months after the testimony, and by the former factory manager of Chisso Minamata, provided evidence that the cause of Minamata disease was waste water from the Chisso factory.

Judgement

The court determined that Minamata disease was caused by organic mercury compound in waste water discharged from the factory, and that the factory was liable for its negligence by providing inadequate safety supervision of the waste water discharged. Furthermore, the court commented that the solarium agreement violated public order and good custom in the Japanese Constitution and was invalid. It calculated a compensatory amount: 18 million yen per death and 16-18 million yen per survivor. The total amount of compensation including lawyers fees was about 930 million yen. Chisso did not appeal.

Impact

The victims' association and Chisso directly negotiated and entered into a compensatory agreement. In the same year, the "Pollution Health Damage Compensation Law" was passed in the Diet and opened the door to indemnity without a suit for Minamata disease. Expanding the application of symptoms of Minamata disease, the second court ordered that the disease should be designated when it is impossible to deny an influence of organic mercury. Since the plaintiff won the 1976 case against the governor of Kumamoto prefecture, which determined his forbearance regarding the designation of Minamata disease, the number of applicants for designation increased. In 1980, the law suit claiming compensation for damages against nation, prefecture, and Chisso was filed and the court ruled that nation and Kumamoto prefecture were fully liable for the claim.

Note:

Minamata disease destroys nerves and causes a dysfunction of the senses and actions. In the early period, there were many cases of patients who had convulsions and died. Also, Minamata babies who had an innate mental or a physical disorder were born. Such damages continued. In addition to the designated patients, there are currently about 2,000 people who claim to be Minamata victims and who have filed a suit claiming compensation for damages. The indemnity problem has not yet been fully resolved.

Osaka International Airport Noise Nuisance Litigation

The suit was filed in 1969. The plaintiff lost the suit at the lower court in 1971, won at the second in 1975, and lost at the Supreme Court in 1981.

Background

Osaka international airport was constructed initially in 1938 as a small-scale airport for propeller planes. The airport was assigned to be an international airport after its return from the U.S. Army. The aircraft were introduced in June 1964, and in August of that year.

Citizens of Kawanishi-city who lived in the flight path of jet aircraft formed the Southern Kawanishi Conference on Countermeasures to the Noise. Then in October, The Conference on the Countermeasures to the Noise of Osaka Airport was organized: this consisted of the mayors and the members of the city councils of the eight cities (later expanded to the eleven cities) around the airport. The members of the conference petitioned the Ministry of Transport to take countermeasures, but the Ministry did not do so. The noise nuisance became extremely severe due to the increasing number of flight year by year and the adoption of larger aircraft.

In 1969, twenty-eight persons, representing the citizens of Kawanishi-city filed a first suit requesting prohibition of flights from 9 PM to 7 AM, and compensation for their mental agony. 126 citizens in Kawanishi-city filed a second suit, and 122 citizens a third suit in Toyonaka-city.

Content

Plaintiff:	28 citizens of Kawanishi-city in the first suit, 126 citizens of that city in the second suit, 122 citizens of Toyonaka-city in the third suit.
Defendant:	The State (Ministry of Transport)
Claim:	The plaintiff claimed the suspension of the airport operation and the compensation for damages due to the noise, fumes and vibration stemming from taking off and landing of jet planes.

Main Issues

In this suit the plaintiff took "personal rights" and "environmental right" as a basis for the claim. The plaintiff insisted on the following points; 1) environmental rights as an extension of personal right, 2) an idea of "general personal right" in the personal right, 3) provision 13 and 25 in the constitution of Japan as the basis of personal right and environmental right, and 4) personal right and environmental right as an "absolute right". The State argued that the plaintiff was complaining about the implementation of governmental authority: if the court decided to suspend the airport operation, it would invade the primary authority of an administrative agency, which meant the violation of the principle of separation of the three branches of government.

Judgement

Though the court agreed to prohibit night flights, 400 plaintiffs appealed to the higher court since it was not from 9 PM but 10 PM to 7 AM.

Osaka higher court then decided to prohibit flights from 9 PM, and complete compensation both for the past and future along with the plaintiff's claim. The State appealed to the Supreme Court, which, in 1981, supported compensation for the past, but dismissed the prohibition of flights and compensation for damages.

Impact

An important principle was established, namely the right of the courts to exercise authority with respect to the operation of an administrative agency, such as a public airport operates.

Note:

The residents under the flight path near the airport are exposed to noise, vibration and fumes. Noise caused by jet flights is the main source of complaint, and of damages.

Shinkansen Super-express Train Noise Nuisance Litigation in Nagoya

The suit was filed in 1974. The plaintiff won the suit in part in 1980.

Background

Shinkansen (meaning new main line) super-express train has played a role as a speedy mass transit system since the high economic growth period in Japan. The number of trains at the beginning was not much more than for conventional trains, but in 1970 when the Osaka International Exposition was held, the number of trains increased as well as the number of cars per train. Since then adverse effects on residents due to the noisy operation of Shinkansen has become a matter of public concern.

The railway near Nagoya-city is elevated and is 6 to 15 meters from the ground. Apart from the vicinity of Nagoya station, the Shinkansen runs along an elevated train at 100 to 200 km/hour as in rural areas. Residents along the railway suffer a variety of nuisances such as loud noise, vibration due to the elevated structure, interference with TV reception, falling objects, disturbance of sleep, study and family conversation. Interference with TV affected houses 150 meters away from the railway. The elevated railway also obscured sunlight and interfered with plant growth.

Content

Plaintiff: 575 persons

Claim: The plaintiff claimed for the suspension of the nuisance and compensation for past damages.

Main Issues

The issue of this litigation was whether the intolerable level could be set within the concept of personal right. Although the court recognized the insistence of the plaintiffs that the suspension was claimed based upon the comprehensive personal right, the court took the publicity of the Shinkansen operation into account.

Judgement

The Nagoya local court ruled as the first judgement that the nuisance did not exceed a tolerance level, but ordered the defendant to pay compensation. The court recognized that the legal basis of the suspension should be the personal right, not the environmental right.

The court allowed compensation money for past damage along with the claim of the plaintiff, but dismissed both the demand for suspension of the nuisance and compensation for future damage.

Impact

The court recognized the legality of the plaintiff's claim for abstract suspension of the nuisance cause which means the claim, not for the specific causal activities, but for the general suspension of the cause of noise and vibration exceeding a tolerance level. Although an abstract suspension has been recognized in some judgements in the past, such recognition was minor in general because the actual countermeasures could not be specified. This judgement can be seen as an advanced step from the criteria in those days.

Tanagawa Thermal Power Plant Litigation

Background

In 1956, the Kansai Electric Power Co. Ltd. constructed the Tanagawa thermal power plant at Tanagawa district in Misaki-cho, the southern most town of Osaka prefecture. The amount of SOx from the plant during its first several years was larger than that recorded in the Yokkaichi-Asthma Litigation. A health survey conducted by the Hygiene Bureau of the Osaka local government in 1972 indicated that the ratio of the patients above 40 years old around the power plant who showed chronic bronchitis syndrome was more than twice than that of unpolluted districts.

In 1970 the residents strongly opposed the proposed construction of a second thermal power plant of 240 kw next to the original plant. The KEP Co. asked the Osaka prefectural governor to approve the construction plan. The governor referred the pollution control measures to the Pollution Control Council. The residents appealed on the basis of the damage done by the first thermal power plant, and opposed construction of the second thermal power plant

In July 1973 the Council determined that the pollution control measures to be taken in the second power plant were insufficient, and the Governor stated that he did not agree with the construction. In August of that year the KEP Co. submitted a revised plan to the Osaka prefectural government. The Osaka prefectural government stated that the plan would be consistent with the Environmental Management Plan of Osaka prefecture, if the generating capacity of the second plant was reduced to 120 kw. The residents immediately formed a plaintiff group and in December they filed the first suit claiming compensation for the health damage of four chronic bronchitis patients, and requesting suspension of the second power plant construction.

Content

Plaintiff:	377 residents in Misaki-cho town including 12 patients.
Defendant:	Kansai Electric Power Co. Ltd.
Claim:	The plaintiff requested the suspension of the construction and operation of the second thermal power plant, and compen sation for the health damages.

Main Issues

Three points need to be established to support the plaintiffs' claim, namely, 1) the fact of air pollution, 2) evidence of the causal relationship between air pollution and the first thermal power plant, 3) evidence that the air pollution carries disease. Definition of the nature of rights such as the environmental right or the personal right was necessary in the claim for suspension of operation.

Chiba Kawatetsu Pollution Litigation

The suit was filed in 1975. The plaintiff won the lower court in part in 1988.

Background

Kawatetsu (Kawasaki Steel Corporation), a large steel manufacturer in Japan, established its factory in Keihin Coastal Industrial Zone in 1950. Factory operation started in 1953, and was expanded during the second period of streamlining after 1955. Residents around the factory subsequently suffered the "Red Smoke" and soot emitted from the factory. Sometimes wells around the factory dried up. The residents complained to Kawatetsu or to the city government.

Since 1960 Kawatetsu undertook a third period of streamlining, and expanded its facilities more still. Annual production capacity became 6500 thousand tons in 1969, being the largest in Japan. In 1968, a person suffering from bronchial asthma committed suicide. In 1970 Kawatetsu released a plan to construct a new steelworks including the 6th steel furnace on reclaimed land. This further stimulated residents' opposition to the Kawatetsu.

In 1972 the resident's movement in the Chiba-city Surveillance Committee on the Soot Effect, released a health survey of the residents around the Katetsu, and this made a great impact on both the residents and the city government. In April of that year a Meeting on Pollution in Chiba-city was formed and as a result the city-mayor established a Relief system for patients of pollution-related diseases. Then the meeting expanded to one aimed at "Elimination of Pollution from Chiba-city" based on the integration of some citizens groups. The citizens movement then tried to establish a "Basic Ordinance for Pollution Control" including a pre-approval system for factory construction and the regulation of the total emissions. The aim of the Ordinance was to place the first priority to the resident's life. However the City Council rejected the proposal of the Ordinance.

In 1975, the Plaintiff Party of the Chiba Kawatetsu Pollution Litigation was officially organized and it filed suit in the Chiba local court. In 1978 the second suit was filed by 231 persons including 37 patients, because the State indicated its intention of relaxing the ambient standard of the NOx concentration.

Content

Plaintiff:	200 residents in the district in the first suit. 231 residents in the second suit.
Defendant:	Kawasaki Steel Corporation (Chiba)
Claim:	The plaintiff claimed compensation for damages, achievement of the environmental quality standards and suspension of construction of the 6th steel furnace.

Main Issues

The plaintiffs intended to establish the criteria for the suspension according to the environmental quality standards, by insisting upon the immediate achievement of environ-

mental quality standards, based on the principle that the standards should be more stringent for residential areas. In court, the significance of the environmental quality standards were examined, and the reasonableness of the standards was argued. Another argument focused on identification of the causal relationship between the emission of sulfur dioxide, nitrogen dioxide and suspended particulate matter from the steelworks, and the health damages which the plaintiffs suffered.

Judgement

The court dismissed the plaintiff's claim for the suspension of emission and that for the suspension of factory operation. The court recognized that the local air pollution with high concentration sometimes occurred since the hourly-average values and daily-average values were rather higher than those in other cities and the environmental quality standards, whereas the annual-average values were not significant from those of other cities. The court judged the reasonable to conclude that these three substances were emitted from the steelworks. The court adopted the judgement of the Supreme Court that the principle concerning the proof of causal relationship could not be modified even though the disease argued may be non-specific disease, and judged the causal relationship of diseases for 60 patients among 61 patient plaintiffs according to the comprehensive examination with a multiple view point.

Annex 11: Water Pollution Responsibilities for Standards & Countermeasures

Establishment of Environmental Standards

- Living environmental items (the environmental standards responding to the type of water body including major rivers lakes and ponds, and coastal water bodies).
- Health items (the environmental standards are uniformly appointed to the whole water system)

Establishment of Effluent Standards

- The government establishes the general standards applicable to the whole water system.
- Local government establishes higher effluent standards where national norms may be inadequate for the achievement of environmental standards in the locality concerned.

Preliminary Arrangements by National Government

- Low interest finance by agencies such as the Japan Environment Corporation, promotion of cooperative work, and favorable treatments in the tax system.
- Assistance to local authorities from national funds for the equipment of sewerage and effluent treatment facilities.
- Favorable treatment for the promotion of equipment, based on the pollution prevention plan, in preferred areas.
- Establishment of water quality environmental standards in major rivers of the country, guidance to the local governments, related research and technology development at national research institutions, and research support.
- Guidance and support for technology development to industry through the Ministry of International Trade and Industry, Ministry of Agriculture, Forestry and Fisheries, and other agencies.
- Planning of new water quality improvement policies (negotiations with relevant ministries, agencies and industry).
- Application of the reserve system and pollution health damage compensation system based on the Mining Industry Law.
- Introduction and application of areawide Air/Water Pollutant Emission Regulation System in the specified areas.
- Support to effluent-treatment-related industry (manufacturers, analyzing companies, design companies, and so on) in 1960s-1970s.

Local Government

- Establishment of environmental standards and effluent standards in the water system of their jurisdiction.
- Notification of the establishment and alteration of the specified facility, orders for the alterations of plans, improvement orders, and penal regulations for violations.
- Supervision and guidance such as monitoring and on-the-spot inspection.
- Control of individual factories and offices by the pollution prevention agreement and so on (including areawide total pollutant load control).
- Equipment of public effluent treatment systems including sewerage and household effluent treatment facilities.

- Participation in the promotion of cooperative work of medium and small-sized factories, and in encouraging the implementation of common treatment facilities.
- Factory location and regulation and from the viewpoint of water system control (including underground water).

Implementation of Direct Effluent Countermeasures

Public Sector

• National Government

- Water quality undertakings of rivers, lakes and ponds, and dams, under its direct control.
- Improvement of countermeasures, such as those against mercury.

• Local governments

- Equipment of sewerage and household effluent treatment works.
- Participation in the promotion of the cooperative work of medium and small-sized factories, and investment in common treatment facilities.

Private Sector

• Internal Measures

- Rationalization of water use and improvement in effluent countermeasures associated with the production process.
- Establishment of effluent treatment facilities.
- Equipment of pre-treatment facilities before discharge into public sewers.

• External Measures

- Connection to public sewerage.
- Cost sharing for investment in sewerage and payment of other fees.

Annex 12: Technologies for Night Soil Treatment and Septic Tanks

As noted in the main text of this report, in 1990, 36.4% of households were connected to a sewerage system; 7.1% had combined septic tanks wastewater plus night soil); 20.3% had single septic tanks (wastewater only); and 36.2% relied upon collection of night soil. Night soil is normally collected by vacuum trucks. Pictures of a typical septic tank ("joukasou") and vacuum truck are in Figures A-12-1 and A-12-2.

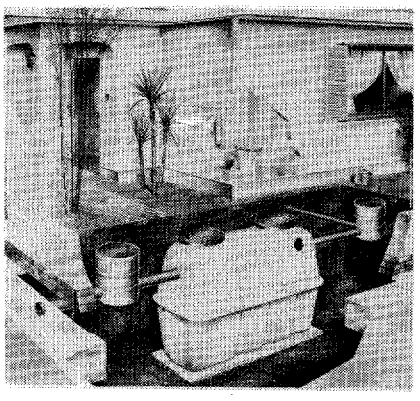


Figure A-12-1: A "Joukasou" or Septic Tank

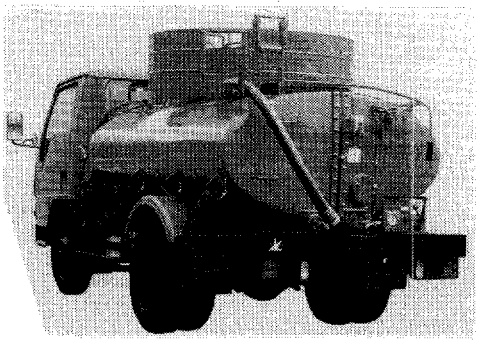


Figure A-12-2: A Vacuum Truck

Technologies for night soil treatment and septic tanks are as follows:

	Storage	Collection	Treatment
Night soil treatment	Night soil tank	Tank trunk	Treatment facility
Single-function septic tank			
■ night soil	Single-function septic tank	—	Single-function septic tank
■ sludge		Tank trunk	Treatment plant
Combined septic tank			
■ night soil/household wastewater	Combined septic tank	—	Combined septic tank
■ sludge		Tank trunk	Treatment plant

Average design capacity per unit construction cost of facilities are as follows:

	liter(l)/person/day
■ night soil	1.3 - 1.5
■ sludge from single-function septic tank	0.7 - 0.8
■ sludge from combined septic tank	1.0 - 1.2

Collection of night soil is once a month and reservoirs with 300-400 l capacity are used for a family of 4-5 members. The structure of single function and combined septic tanks is regulated by law. There are several treatment methods and capacities. The following capacities are the most popular:

	BOD removal rate	BOD concentration
Single septic tank	more than 65%	below 90 ppm
Combined septic tank	more than 90%	below 20 ppm

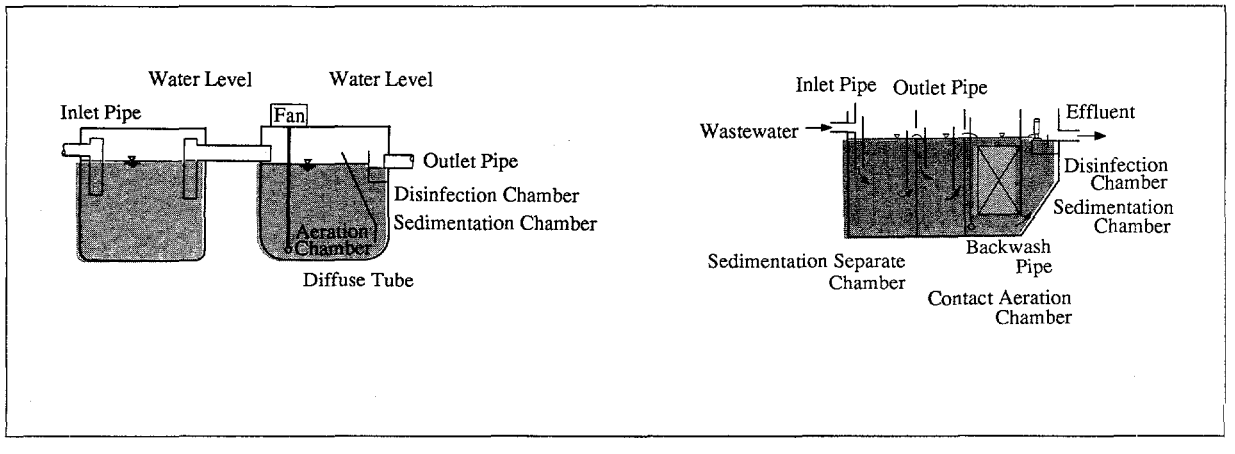
These septic tanks should be laid underground; construction can be completed within 5 days. Construction cost is 400,000 yen for a single septic tank for a standard family and 600,000 yen for a combined one. Maintenance costs for combined septic tanks are 30,000-40,000 yen/year for a family of 5 persons.

The comparison of costs of nigh soil collection, joukasou (combined septic tank) and sewerage system is difficult. The outline of the cost structure is as follows.

Figure A-12-3: Typical Structure of Septic Tanks

Single-Function Septic Tanks

Combined Septic Tanks (contact aeration method)



a. The annual costs charged to a household (5 family members) are;

Night Soil Collection	32,000 yen
Combined Joukasou	92,000 yen
Sewerage	100,000 - 130,000 yen

b. Construction costs per household are;

	Household	Joint Facility (pipes / treatment plant)
Night Soil Collection	50,000 yen	100,000 yen
Combined Joukasou	600,000 yen	100,000 yen
Sewerage	200,000 yen	150,000 - 200,000 yen

c. Running costs (including tank trucks for collection) are;

Night Soil Collection	20,000 yen (16,000 yen is labor cost)
Combined Joukasou	53,000 yen (34,000 yen is labor cost)
Sewerage	30,000 - 40,000 yen (10,000 yen is labor cost)

	Cost Structure
Night Soil Collection	Construction cost is 50,000 yen/household including installation cost (The price of 400 liter tank is 30,000yen), 2,500 yen/household/year for 20-year depreciation. The cost related to tank truck for collecting night soil including truck depreciation and fuel is 1,500 yen/household/year. Labor costs for 2-3 staff/ truck (drivers and workers) are 15,000 yen/household/year. Construction cost of treatment plant is 10 million yen/kl/day and facility depreciation for 20 years is 1,500 yen/kl. Running cost is 2,000 yen/kl. Cost of night soil treatment is 4,500 yen/kl including labor cost of staff in treatment plant (treatment cost per household is 13,000 yen/year). Total cost is 32,000 yen/household/year, of which 16,000 yen is labor cost.

Joukasou (Combined System)	Construction cost of tank for 5 persons is 400,000 yen (including 200,000 yen of installation cost) and 30,000 yen/household/year for 20-year depreciation. Total annual construction cost per household is 65,000 yen including electricity of 15,000 yen/year and costs of facility inspection and water quality monitoring and cleaning of 20,000 yen/year. Collection cost of sludge from joukasou is 15,000 yen/household/year. Treatment cost in treatment plant is 12,500 yen/household/year. Total cost is 93,000 yen/household/year.
Sewerage	Construction cost (mainly piping on the premises) is 200,000 yen/household and 10,000 yen/household/year for 20-year depreciation. Construction cost per person including conduit and treatment plants is 300,000 - 400,000 yen for medium sized town, and 1.5 - 2.0 million yen/ household of 5 families. Annual cost per household is 60,000 - 80,000 yen Maintenance cost is 30,000-40,000 yen/household. Total cost is 100,000-130,000 yen/household/year. The rate of fee collection is 60 - 80% of maintenance cost.

Note:

The costs for labor and engineering works in developing countries would be considerably lower than the Japanese ones.

If the interest for facility construction cost is included, the cost for sewerage (since the share of construction cost is large) will be much larger.

Sludge from septic tanks is collected along with night soil by tank truck and carried to treatment plant. There are about 18,000 trucks which collect 96,000 kl/day of night soil and sludge in 1990, namely, one truck collects 5.3 kl/day.

The capacities of tank trucks are 1.8 kl, 2.7 kl and 3.1 kl. Trucks are filled 2-3 times a day and 5.3 kl/day in all. In terms of population served, collection amounts per truck are as follows:

Night soil	4,000 persons
Single septic tank	6,000 persons
Combined septic tank	5,000 persons

The price of a tank truck in Japan shown below can be reduced if the vacuum facility is equipped with a chassis produced in developing countries:

kl truck	million yen
1.8	1.83
2.7	2.12
3.1	3.37

There are 2-3 persons per truck for collecting night soil. About 90% of the collection is carried out by private collecting companies, and a total of 43,000 persons are employed in this work. Most of the night soil and sludge is transported to and disposed of at night soil treatment facilities. About 8% is dumped into the ocean and some is still utilized as fertilizer in farm villages.

Annex 13: Staffing of Local Government Activities

Table A-13-1: Staff in Prefectures and Ordinance-Designated Cities in Charge of Environmental Pollution

	Full-time officials			Concurrent staff officials			Total
	Clerical	Technical	Total	Clerical	Technical	Total	
Agency's head office	1,140	1,686	2,826	62.1	48.7	110.8	2,936.8
Outposts	613	3,036	3,649	139.1	709.7	848.8	4,497.8
Total	1,753	4,722	6,475	201.2	758.4	959.6	7,434.6

Remarks:

1. Surveyed by the Environment Agency.
2. The figures for concurrent staff officials are those for which the number of staff officials who are also in charge of another line of administrative work is proportionally distributed, depending on the volume of their work.
3. The number of staff officials who deal with wastes and sewer systems are excluded.

Table A-13 -2: Staff in Prefectures and Ordinance-Designated Cities in Charge of Nature Protection

	Full-time officials			Concurrent staff officials			Total
	Clerical	Technical	Total	Clerical	Technical	Total	
Agency's head office	449	387	836	43.0	34.8	77.8	913.8
Outposts	126	227	353	122.3	314.9	437.2	790.2
Total	575	614	1,189	165.3	349.7	515.0	1,704.0

Remarks:

1. Surveyed by the Environment Agency.
2. The figures for concurrent staff officials are those for which the number of staff officials who are in charge of another line of administrative work is proportionally distributed,depending on the volume of their work.

Table A-13-3: Staff in Charge of Environmental Pollution in Municipalities (Full-time)

Organizational Classification	Type of staff officials	Clerical	Technical	Total
Agency's head office	Municipalities which have bureaus, departments and divisions(offices) specialized in pollution	1,284	1,140	2,424
	Municipalities which have only subdivisions specialized in pollution	1,048	350	1,398
	Municipalities which have only staff officials specialized in municipalities	331	39	370
	Subtotal	2,663	1,529	4,192
	Municipalities which have outposts	60	282	342
	Total	2,723	1,811	4,534

Remarks:

1. Surveyed by the Environment Agency.
2. The number of staff officials in charge of wastes and sewer systems is excluded.

Annex 14: Comprehensive Basin-wide Planning of Sewage Systems

Basic Survey

The purpose of the basic survey is to understand the present situation and assay the prospects of the planning area. To understand the natural condition, topographic features of the basin such as ground slopes, existing rivers, and drainage are noted. Current flow rates and water levels, existing water channels, drainage and existing basin development plans are surveyed. Meteorological data such as precipitation and wind direction and velocity in lakes and coastal areas are surveyed. Current and chronological water quality data are collected at various points of the river.

Surveys are carried out on existing sewage systems to find out information such as service area, population served, locations of main pipes, treatment plants, treatment methods and capacity, quantity and quality of treated wastewater, extension plans, improvement plans and useful life of facilities. In addition, night soil treatment plants and joukasous (septic tanks) are surveyed. Pollutant discharge standards for the area are also reviewed.

To determine the land use for the present and the target year, urbanization promotion areas, land use plans (zoning, agricultural land use plans), major development plans and major public facilities are surveyed. Present and forecasted population for the target years are surveyed. Surveys are also carried out for present industrial production from each industry and its future prospects. Present status and future prospects for agriculture, especially stock farming, are also surveyed because in certain areas water pollution is largely caused by livestock excreta. Present water intake rates, water use rights, water intake points and future prospects of water demands and planning for required target years are studied. If fishing rights are reserved for the rivers, lakes or coastal areas in the planning area, present catch rates are studied.

Pollution Loads and Pollution Analysis

In CBPSS, pollution loads are calculated for domestic wastewater, industrial wastewater, stock farming, other man-made pollution sources as well as natural pollutants. Pollution loads from domestic wastewater are estimated based on per capita pollutant discharge and business activities in the area. Pollution loads from tourists are calculated separately. For industrial wastewater from large factories, surveys are carried out individually to determine pollutant generation rates and discharge rates. For smaller factories, rates are calculated on the basis of average wastewater discharge rate per unit production and the industrial production rates. Pollution loads from stock farming are calculated using per head pen washing water and per head excreta amount.

Man-made pollutants such as loads discharged from night soil treatment plant and joukasous decrease every year since sewage systems are replacing them. However, per capita discharge rates from these facilities are assumed to remain the same as present ones. Natural pollution loads from forests and paddy fields etc. are also taken into account for the cal-

culation of total pollution loads in the planning area.

Following the calculation of pollution loads, water quality simulation tests are carried out in the planning area to calculate water quality at each monitoring point. The planning area is divided into blocks considering sub basin, water quality monitoring points, etc. Pollution loads are calculated for each block. Tolerable limits for pollution loads to satisfy water quality standards at monitoring points are thus calculated. Pollutants generated at various sources are reduced by sedimentation or decomposition in small channels and by purification effects in the main stream before they reach the water quality monitoring points. Such pollutant reduction is taken into account.

Pollution simulation in non-tidal rivers is carried out considering such purification effects. For pollution simulation in tidal rivers, appropriate methods are selected among various simulation methods. As for lakes, appropriate methods such as the complete mixing model, plug flow model, diffusion equation etc. are selected. Pollution in coastal areas is simulated using diffusion equations.

A pollutant reduction plan is discussed after calculating tolerable pollution loads. Basically, tolerable pollution loads are allocated pro rata with the present pollutant discharge ratio. For instance, loads from domestic wastewater, industrial wastewater and stock farming should be reduced at the same ratio. In general, no reduction is set for pollutants from agricultural fields and natural sources. However, if effects of such loads are significant (for example, in closed water areas), reduction measures are considered.

Load reduction from domestic wastewater is achieved by the construction of a sewer system. Loads from industrial wastewater are reduced by discharge regulation. Loads from stock farming are reduced by discharge regulation or change of agricultural practices. Sewerage system construction areas are recommended so that pollution reduction from domestic wastewater can be satisfied at every monitoring point most effectively. Pollution load reduction measures other than sewer construction must be taken by the polluters. Such measures are recommended to them in the CBPSS.

Sewage System Planning

In CBPSS, sewage system construction plans are worked out for priority areas where sewage systems are required to achieve environmental standards. Additional areas can be added if improvement of the living environment is necessary. In sewage system planning, things such as topography, siting of wastewater treatment plants in the area, existing sewage systems and authorized construction plans, effects of sewage systems on bodies of water, available technology, effective use of treated wastewater, cost and benefit, relevant laws and regulations, opinions of relevant municipalities, etc. are all taken into consideration.

If advanced wastewater treatment is necessary to satisfy environmental quality standards,

appropriate facilities can be incorporated in the planning. In closed water areas (lakes or bay areas) where removal of nitrogen and phosphorus is necessary, removal facilities are considered.

To calculate the capacities of wastewater treatment plants wastewater quantity is calculated by summing up domestic wastewater, ground water, industrial wastewater and wastewater from travellers. Domestic wastewater is calculated as the sum of wastewater from households and business activities. Ground water use is estimated as 10 - 20% of the daily maximum domestic wastewater amount. In the areas where travellers count for more than 30% of inhabitants, the number of travellers is predicted. Industrial wastewater and stock farming wastewater in the planning area are looked at and a decision is made for each facility whether their wastewater should be treated by a sewage system. Wastewater which should be treated on site or does not require treatment (such as cooling water from factories) is excluded from the calculation.

Construction costs and operation/maintenance costs of various alternative treatment systems are calculated and compared. Construction costs are estimated after schematic design. However, cost curves may be used when they fit the features of the planning area. In the cost comparison, cost effectiveness in intermediate target years should also be taken into account.

Several alternatives should be considered for all municipalities in the planning area in order to select an optimum master plan to satisfy environmental quality standards in the basin. Based on the optimum master plans, individual construction projects are prioritized considering the effectiveness of each project in terms of the amelioration of water quality at the monitoring points.

Total construction costs are then estimated for the optimum plan. The required costs are calculated for each year. Consideration is also given to the cost effectiveness for individual sewage planning areas or municipalities. The main benefit from the construction of sewage systems is the increase in the value of water resources created by the attainment of environmental quality standards. For instance, benefit is evaluated from various aspects such as sightseeing, recreation and aesthetics as well as direct water use such as drinking water supply, industrial water supply and agricultural and fishery use. Benefits are evaluated using two scenarios. One is an estimation using current population, industry, land use and water resource use whereas population forecasts are used in the other estimation.

Annex 15: Summary of Government's Environmental Management Instruments

Policy Instruments	Features
1. Environmental Standards	1) Consideration of the capacities of the three parties: citizens, government Standards and enterprises. 2) Ambient air quality standards. ■ Common standards are applied in Japan. 3) Water quality standards: a. Standards regarding health items are commonly applied in Japan, while standards regarding life environment items are decided according to types of water bodies, which are determined mainly by purposes of water usage, i.e., drinking, agricultural and industrial uses. b. The central government decides types of major water bodies while local governments decide types of all other water bodies. c. Both central and local governments have sufficient discussions with major water users and other concerned parties prior to the determination of types (water standards) of each water body so that the standards to be achieved should be realistic.
2. Emission standards	1) The central government issued common emission standards to be applied in Japan. 2) Local governments have authority 1) to enforce stricter standards than the national ones and 2) to apply the national emission standards to wider sources of pollution if they consider that those are necessary in order to achieve the national environmental standards. 3) As a result, most local governments enforce stricter standards or applied the standards to wider sources of pollution. 4) Total effluent emission control is enforced in Setonaikai Inland Sea and some other water bodies. Target maximum emission amounts are decided by areas. 5) Gas Emission Control:

	a. Emission control of SOx: K value control by areas is introduced. Types of fuel used are also controlled. b. Emission control by types of vehicles are introduced. c. Total emission control for gases are applied to designated areas respectively. 6) Toxic Substance Emission Control: a. Only eight (8) gases and ten (10) chemical substances are subject to emission control. The designated items though much less in number than U.S. are subject to very strict control. b. Control aspects include manufacturing, usage, emission, disposal facilities (structure, operation and maintenance standards), monitoring, guidance and law enforcement. c. Adequately strict control and monitoring are applied to facilities that may possibly emit toxic substances, while control of toxic substances contained in solid waste is yet to be improved. d. The government plans to revise toxic substance emission control regulations based upon Basel Convention and International Treaty on Prevention of Ocean Pollution. 7) Noise and Vibration Control: a. Environmental standards regarding noise and vibration are set by region in the same manner as water quality standards. b. Particular emphasis is placed on the noise and vibration problems arising from airports and Shinkansen high speed railway. 8) Control of Ground Settlement: a. Control on utilization of groundwater and development of water resources for industrial use.
3. Designation of priority areas for environmental pollution	1) The central government designated EPC priority areas. Major urban and industrial regions were desig-

control (EPC)& Basin-wide		nated as EPC priority areas.
	2)	Local governments prepared EPC plans for the designated areas. An EPC plan includes plan for reduction of emission and development of sewage systems.
	3)	A system for co-ordinating anti-pollution measures and sewage planning throughout a river basin system.
4. Institution building and staff training	1)	Establishment and execution of training program for EPC staff of local governments.
	2)	Establishment and strengthening of monitoring and research sections at both national and local government levels.
	3)	Strengthening of local health centers' capacity in dealing with EPC.
5. Management of relationships between local governments and companies	1)	Obligatory Designation of Company's EPC Manager: A law requires polluting companies to designate a company staff as a company's EPC manager who have the responsibility to decide on EPC measures to be taken by the company.
	2)	Obligatory Reporting of Effluent Quality Data: Companies are required to submit effluent quality data as monitored by the company.
	3)	Obligatory Reporting of Specified Facilities (Effluent control facilities). Installation, Renewal and Remodeling through which local governments obtain information on company's EPC measures.
	4)	Factory Inspection: Local governments inspected factory effluent.
	5)	Establishment of EPC Association at Prefectural government level through which cooperation with private firms are strengthened.
	6)	System of certified pollution control engineers.
6. Technical Assistance	1)	Establishment of Japan Environmental Corporation (JEC) responsible for providing both technical and financial assistance.

	2)	JEC prepares plans for development of industrial parks to which small and medium sized manufacturers move in order to share common facilities for effluent treatment among moved factories, and to lessen pollution impacts on surrounding residential areas.
	3)	Preparation of technical guidelines regarding industrial effluent treatment by types of industries.
	4)	Research and development through cooperation with private sector.
	5)	Fostering of EPC equipment manufacturers and water and air quality monitoring companies.
	6)	Standardization and certification of EPC equipment.
	7)	Recognition of equipment that is appropriate.
7. Financial assistance	1)	Establishment of JEC to provide low interest loans (about 2% lower rates than commercial rates) for private companies and local governments to construct EPC facilities, and relocation of factories to industrial parks planned and constructed by JEC.
	2)	Low interest loans are provided also by other public finance corporation such as Japan Development Bank, Small & Medium Enterprise Finance Corporation, and National Finance Corporation.
	3)	Total loan amounts ranges 30%-40% of the total private investments in EPC.
8. Direct government activities in environmental protection	1)	Local governments are responsible for i) night soil management, ii) municipal solid waste management, and iii) sewage piping and treatment including recycling of treated water, iv) water conveying for cleaning of polluted lake and river water, and v) removal of sea bottoms and polluted with toxic substances and dredging of accumulated sands of rivers and seas. (Private sector is responsible for management of designat ed solid industrial water which is categorized into 17 types.)
	2)	The government issued guidelines regarding solid

		waste disposal facilities and their operation and maintenance.
	3)	JEC plans and constructs industrial parks, common EPC facilities, and green zones (to separate industrial zones from residential zones), national parks; and hand over them to private firms or local governments. (They purchase those facilities from JEC with low interest loans provided by JEC).
	4)	Environmental impact assessment procedures.
9. Industrial Location	1)	Local governments control polluting factories' site locations by controlling construction permits guidance and designation of land usage, and promotion of industrial relocation.
10. Environmental Education	1)	Environmental education is included in most school curriculum.
	2)	Both central and local government environmental campaign for strengthening people's awareness for environmental values.
11. Environmental cleaning	1)	An environmental law requires that polluting firms are responsible for bearing costs of the environmental cleaning activities such as removal of sludge contaminated with heavy metals.
12. Compensation of victims of pollution	1)	An environmental law requires that polluting firms should pay compensation to victims of pollution. The law also requires that even if cause and effect relationships are not proved, suspicious polluting firms in pollution areas should pay compensation to victims according to emission amounts, areas and other criteria.
	2)	The Environmental Pollution Coordination Committees at the central government level is responsible for arbitration of conflicts arising in connection with pollution problems.

Annex 16: Revision of Water Quality Standards in Japan

Drinking water quality standards, environmental water quality standards and industrial effluent quality standards are now experiencing drastic revisions in Japan. First of all, new national drinking water quality standards were established on 21 December 1992 by a Ministerial Order of the Ministry of Health and Welfare, and they will be put into effect on 1 December 1993. Subsequently, new environmental water quality standards were established on 8 March 1993 by a Directive of Environment Agency aimed mainly at the achievement of acceptable water quality at sources. Attainment of newly established environmental water quality standards requires the setting of corresponding industrial effluent quality standards. Therefore the work required to establish new industrial effluent quality standards is now being carried out intensively by the Environment Agency. The standards are expected to be ready by the end of fiscal 1993 (March 1994).

Revision of Drinking Water Quality Standards

The first national standards for drinking water quality in Japan were established in 1958 based on the Water Works Law. They contained mainly microbiological indices, inorganic substances and aesthetic indices. After several minor revisions, the last standards, consisting of 26 indices, were established in 1978.

Recently, water sources nationwide have been polluted by chemical substances such as halogenated organic substances and pesticides. In addition, the number of people suffering from bad-tasting drinking water caused by eutrophication of water sources has been increasing. Safety- and taste-conscious consumers are exhibiting a rapid behavioral change, consuming more bottled mineral water and using more home water purifiers. This behavioral change by Japanese consumers, who used to depend almost entirely on tap water for their drinking water supply, shows deep societal concerns about drinking water quality deterioration.

Thus, total revision of drinking water quality standards has been urgently needed. New standards based on the Water Works law were established in December 1992 and they consist of 46 indices (29 indices relating to human health and 17 indices relating to the acceptability to consumers).

Revision of Environmental Water Quality Standards

Environmental water quality standards were first established in 1971 based on the Basic Law for Pollution Control with the objective of protecting human health and conserving the living environment. They are serving as policy targets for measures to be taken for the control of water pollution in rivers, lakes, seas and ground water.

They consist of indices relating to the protection of human health and indices relating to the conservation of living environment. The former are uniformly applied in all water bodies while the latter differ from water body to

water body depending on the purpose of their use.

There were originally eight indices relating to the protection of human health (CN, Alkyl-Hg, Total-Hg, Organic-P, Cd, Pb, Cr(VI) and As) when the standards were established in 1971. The standards were revised in 1975 adding PCB as an additional index. 18 years have passed since the last revision. As far as the nine indices relating to human health are concerned, environmental water quality all over Japan has been satisfactory in almost all cases thanks to the concerted efforts of related parties. However, the strong necessity to revise them has become evident in recent years because of water pollution caused by the widespread use of halogenated carbons in advanced industries and pesticides on golf courses among others.

The recent upgrading of drinking water quality standards has given the final and decisive momentum towards the revision of environmental water quality standards. Revised environmental water quality standards were established by a Directive of the Environment Agency on 8 March 1993. Revision was made only for indices relating to human health leaving indices relating to the living environment such as BOD and COD as they are.

The indices for new environmental water quality standards have been decided taking into account the last scientific findings and related legislation both in Japan and overseas. Their levels have been established considering the health effects of intakes both through drinking water and through fish and shellfish. Indices and levels are almost the same as newly established drinking water quality standards. Exceptions are chlorination by-products and substances that cause bad tastes. They are not included in environmental water quality standards. Standards for Pb and As are now more stringent than before.

One important difference between the old and new standards is that environmental water quality is now evaluated based on the annual mean values while before it was evaluated by maximum values. This is because the standards have been established taking into account mainly the long term health effects of toxic substance intake. The only exception is the standard for Total-Cyanide. Considering its acute toxicity, it is still evaluated based on the maximum level.

Guideline values have been developed for indices relating to human health for substances whole present levels are not yet likely to cause immediate health effects. These total 25 indices are called monitoring indices. The Central Government as well as local governments are expected to monitor these indices continuously. These indices will be converted into environmental water quality standards when it becomes necessary.

Future Tasks

Newly established drinking water quality standards will require a series of measures such as strengthening of monitoring systems, protec-

tion of water sources, development and use of advanced water purification technologies. Attainment of newly established environmental water quality standards will require measures such as setting of corresponding industrial effluent quality standards, revision of standards for the final disposal of solid wastes, strengthening of water quality monitoring systems, etc. New industrial effluent quality standards are expected to be ready within fiscal 1993.

As for long term tasks, the following three can be pointed out especially as regards environmental water quality standards: 1) continuous revision of environmental water quality standards and monitoring indices. in addition, a comprehensive toxic substance management system has to be developed covering media other than water such as air, soil and food; 2) newly established environmental water quality standards do not include precursors of chlorination by-products. They should be taken into account in order to make drinking water safer; 3) newly established environmental water quality standards pay attention to human health effects caused by chemical substances. They will also be required to take into account the effect on aquatic organisms and eco-systems.

Table A-17-1: Aircraft Noise Standards

Category of area	Standard value (in WECPNL)
I	70 or less
II	70 or less

Note:

Category I area stands for the area for exclusively residential use and category II area for the other area where normal living conditions should be preserved.

Airport category[1]		Target date[3]	Improvement goals
Airport to be build in future		Immediately	
Existing Airports			
Third class and equivalent airports		Immediately	
Second class airport [2] except Fukuoka Airport	A	Within five years	
	B	Within ten years	Within five years to attain less than 85 WECPNL (or 65 WECPNL or less indoors in areas exceeding 85 WECPNL)
New Tokyo International Airport			
First class airports (except for New Tokyo International Airport) and Fukuoka Airport		As soon as possible within ten years or more	1. Within five years to attain less than 85 WECPNL (or 65 WECPNL or less indoors in areas exceeding 85 WECPNL) 2. Within ten years to attain less than 75 WECPNL (or 60 WECPNL or less indoors in areas exceeding 75 WECPNL)

Notes:

1. Airports were categorized as of effective date (December 27, 1973) of these standards
2. Airports of category B of second class are those where there are regular commercial landings and take-offs of aircraft equipped with turbo-jet engines, and category A means the others.
3. The target dates are to be counted from the date of establishment of the environmental quality standards.

Table A-17-2: Shinkansen Noise Standards

Category of area	Standard value (in dB (A))
I	70 or less
II	70 or less

Note:

Category I area stands for the area for mainly residential use and category II area for other purposes, including commercial and industrial areas, where normal living conditions should be preserved.

Classification of zones along the Shinkansen Superexpress railway		Target date		
		Existing lines	Lines under construction	New lines
a. Zones 80 or more		Within 3 years	Immediately on start of service	Immediately on start of service
b. Zones more than 75 and less than 80	A	Within 7 years	Within 3 years of start of service	
	B	Within 10 years		
c. Zones more than 70 and less than or equal to 75		Within 10 years	Within 5 years of start of service	

Notes:

1. The subdivision "A" under the "b" classification stands for zones within the region in which there is a succession of category I area and subdivision "B" stands for zones except subdivision "A"

2. The existing lines, lines under construction, and new lines in the table refer to the following.
   (1) Existing lines: The Tokyo - Hakata section.
   (2) Lines Under Construction : The Tokyo - Morioka, Omiya - Niigata. and Tokyo - Narita sections.
   (3) New lines : New lines being those other than the lines of (1) and (2) above

3. With respect to existing lines, the target dates for achievement are calculated from the date when the environmental quality standards are established.

Table A-17-3: Vehicles Noise Standards

Category of Cars			Noise during Acceleration					Noise in Normal Run		Noise close to Exhaust
			1971 regulation	1976,77 regulation	1979 (First Goal)	Second Goal		1951	1971	
Large-sized	Total weight exceeds 3.5 ton max. horsepower below 200	Large bus	92	89	86	83	1984	85	80	107
		Large truck				83	1985			
		Tractor, Crane truck, etc.				83	1986			
Medium-sized	Total weight exceeds below 200	3.5 ton max. horsepower	89	87	86	83	1983		78	105
Small-sized	Total weight below 3.5 ton	Small truck and bus	85	83	81	78	1984		74	103
		All wheel drive				78	1985			
Passenger Car	Capacity of 10 passengers		84	82	81	78	1982		70	103
Two-wheeled	Small vehicle with two wheels(below 250cc displacement volume) or light vehicle with two wheels		Small 86	83	78	Small 75	1987		74	99
			Light 84			Light 75	1985			
Motorized Two-wheeled	Category I(below 50cc) or Category II(50,125cc)		II 84	79	75	II 75	1986		70	95
			I 80			I 72	1984			

Pollution Control Agreement

(Between Yokohama City and Isogo Thermoelectric Power Station of Electric Power Development Co. Ltd.)

President
Electric Power Development Co., Ltd.

FY 39 Bi, 1070
December 1, 1964

Dear Mr. ————,

Re: Pollution Control of Isogo Thermoelectric Power Station

I am writing in regard to the pending request made by Tokyo Electric Power Co., Ltd. (TODEN) to allow Electric Power Development Co., Ltd. (EPDC) to use part of TODEN's Negishi coastal reclaimed site. Given the fact that the project concerned constitutes part of the national coal policy of the central government, the Yokohama Municipal Authority is willing to cooperate as much as possible.

We have carefully assessed the likely environmental impacts of the said project as the planned project site is located near to residential areas.

We have requested the central government's clarification of certain points relating to the project which we believe necessary. We are now in receipt of a reply and are in a position to request the observance of the attached recommendations by your company as a condition for our consent for the project. We will notify TODEN of our consent upon receipt of your agreement to these recommendations.

We would also like to remind you that the proposed power station shall be required to strive for the mutual prosperity of the citizens of Yokohama as long as it is situated within our municipal boundaries and, therefore, expect your company's public announcement of its intention to actively cooperate with the pollution control measures adopted by the Yokohama Municipal Authority.

Yours faithfully,

Mayor
Yokohama City

Recommendations for Pollution Control of Isogo Thermoelectric Power Station of Electric Power Development Co., Ltd.

1. ■ As the meteorological observation data obtained by the Yokohama Municipal Authority (YMA) and the wind tunnel test results established by your company are extremely important, the design of the new power station shall fully incorporate all implications of such data and results.

2. ■ As the meteorological conditions are influential factors of air pollution, the EPDC shall install our own anemoscope and anemometer, etc. to obtain meteorological data with a view to its use to control air pollution. The EPDC shall fully cooperate with air pollution surveys conducted by the YMA.

3. ■ The YMA understands that the EPDC plans to achieve a total dust collection efficiency of not less than 98% with the combined use of a multi-cyclone dust collector and Cottrell precipitator. This level of efficiency shall be observed and all necessary arrangements shall be made to effectively deal with accidents.

4. ■ The YMA understands that the planned chimney height is 120m with a discharge velocity of 30 m/sec at the rated load and a flue gas temperature of 130°C. These conditions shall be strictly observed and proper arrangements shall be made to prevent down draft or any other undesirable flue gas phenomenon.

5. ■ The YMA understands that the fuel coal for the planned new power station will be pulverized Hokkaido coal with low ash and sulphur contents. The EPDC is required to continuously use high quality coal, i.e. coal with low ash and sulphur contents. The heavy oil which will be used as auxiliary fuel shall also have a low sulphur content.

6. ■ The YMA understands that that the dust density at the Isogo Coal-Fired Power Station using the above fuel will be 0.6 g/Nm^3. This density shall be continuously maintained. Similarly, the emission concentration of sulphur dioxide is estimated to be 500 ppm which shall not be exceeded at any time.

7. ■ All units and equipment shall be installed indoors to minimize noise pollution in the neighboring area. Should the outdoor installation of some equipment be found to be necessary, a silencer shall be provided for each piece of equipment to minimize noise. The necessary measures aiming at maintaining the noise level of the Isogo Coal-Fired Power Station level at the current 40 decibel or under shall be introduced vis-a-vis neighboring residential areas.

8. ■ Proper waste water treatment systems shall be introduced to treat the waste water from the steam condenser, cooling water, blow water from the boilers and miscellaneous waste water discharged from the premises. An oil separator shall be introduced to remove the oil and grease used for machinery and equipment to prevent the contamination of sea water. All necessary precautions shall be taken to prevent sea pollution by coal transport vessels.

9. ■ Scattering of the ash collected by the dust collectors and hopper, etc. shall not be allowed and proper care shall be paid to its trans-

portation for disposal.

10. ■ All necessary arrangements shall be made and care taken to prevent spontaneous ignition or dust dispersion at the coal yard. Prior meetings with the Yokohama Fire Service to introduce all necessary measures to prevent fires and other disasters and all subsequent instructions by the Yokohama Fire Service shall be strictly observed.

11. ■ Regular measurements and analysis of the fuel constituents, soot and dust concentrations, soot and dust collection efficiency, noise level and waste water shall be conducted. The measurement and analysis records shall be submitted to the YMA whenever such data is requested by the YMA. The EPDC shall permit municipal officers responsible for pollution control entry to the Isogo Coal-Fired Power Station to conduct any necessary inspections or surveys when deemed appropriate by the YMA as long as such inspections and surveys do not disrupt the normal operation of the power station.

12. ■ Should any occurrence of pollution by the Isogo Coal-Fired Power Station be predicted, the EPDC shall swiftly take the necessary measures under instruction by the YMC through mutual consultations between the YMC and EPDC.

13. ■ Should any of the above conditions not be observed by the EPDC or should actual damage occur due to the operation of the Isogo Coal-Fired Power Station, the YMA may apply the necessary pollution control measures through consultations with the EPDC. All expenses incurred in applying such measures shall be borne by the EPDC.

14. ■ Should the EPDC wish to contest any of the pollution control measures applied by the YMA pursuant to Clause 13 above, a third party committee shall be requested to rule on the issue. The title, composition, operation and scope of activities of this committee shall be separately determined through consultations between the YMA and EPDC. Should the committee find the measures applied by the YMA to be inappropriate, all expenses relating to the said measures shall be borne by the YMA.

Mayor
Yokohama City

Thermoelectric No. 317
December 1, 1964

Dear Mr. Mayor,

Re: Pollution Control Measures for EPDC's Isogo Coal-Fired Power Station

We are in receipt of your letter (FY 39 No. 1070) dated December 1, 1964 regarding pollution control at the power station in question and we would like to express our utmost gratitude for your kind understanding of our project to construct the Isogo Coal-Fired Power Station.

We are pleased to announce our readiness to introduce pollution control measures in line with the recommendations given by the Yokohama Municipal Authority.

We are fully aware of the special aspect of the site in that it is adjacent to residential areas. We are fully prepared to make every effort to establish positive understanding and trust between ourselves and the local residents in the construction, as well as operation, of this power station and we would like to humbly request the full cooperation of the YMA.

We hope to commence preparatory work, including the construction of temporary structures, as soon as possible to complete the construction of the new power station on schedule.

Please allow me to thank you in advance for your kind consideration of and assistance for the matter concerned.

Yours faithfully,

President
Electric Power Development Co., Ltd.

President
Electric Power Development Co., Ltd.

FY 42 No. 683
July 21, 1967

Dear Mr.————,

Re: Recommendations for Pollution Control Measures Relating to Installation of No. 2 Power Generation Unit at Isogo Thermoelectric Power Station

We are in receipt of your request to authorize the new No. 2 Power Generation Unit at the Isogo Thermoelectric Power Station. Having examined your request from the viewpoint of preserving a healthy environment for our citizens, we would like to make several recommendations as attached. Should the Electric Power Development Co., Ltd. find these to be acceptable, please provide me with the necessary confirmation at your earliest convenience.

Yours faithfully,

Mayor
Yokohama City

Recommendations Relating to New Installation of No. 2 Power Generation Unit at Isogo Power Station of EPDC

1. ■ The Yokohama City Authority (YCA) would like the EPDC to note that the YCS shall apply all the recommendations made for the No. 1 Generation Unit at the Isogo Thermoelectric Power Station set forth in our letter FY 39 No. 1070 dated December 1, 1964, except the following two issues, to the proposed No. 2 Generation Unit.

2. ■ In view of the local topographical and meteorological conditions, emission from the No. 1 Unit and compounding with emission from other local factories, new conditions shall apply to flue gas. These shall be a minimum height of 140m for the chimney, a minimum discharge velocity of 30 m/sec at the rated load and a minimum flue gas temperature of 130°C.

3. ■ With regard to the electric dust collector, even if it is the sole collector to be used, the dust collection efficiency shall be not less than 98%.

Mayor
Yokohama City

Thermoelectric No. 174
July 25, 1967

Dear Mr. Mayor,

Re: Air Pollution Control Measures at Isogo Thermoelectric Power Station

We are in receipt of your letter (FY 42 No. 683) dated July 21, 1967 regarding the above and would like to express our sincere gratitude for your kind assistance in regard to the construction of the Isogo Thermoelectric Power Station.

We are pleased to announce our readiness to introduce pollution control measures in line with your recommendations described in your above letter.

Please allow me to thank you in advance for your further understanding of and assistance for any issue arising from the planned construction of the No. 2 Power Generation Unit.

Yours faithfully,

President
Electric Power Development Co., Ltd.

President
Electric Power Development Co., Ltd.

FY 46 No. 702
February 15, 1972

Dear Mr. ————

Re: Pollution Control Measures for EPDC's Isogo No. 2 Thermoelectric Power Generation Unit

The Yokohama Municipal Authority (YMA) highly appreciates the active cooperation of the Electric Power Development Co., Ltd. in regard to the introduction of pollution control measures at the Isogo Thermoelectric Power Station in response to our recommendations made in our official letter (FY 39 No. 1070) dated December 1, 1964.

Having carefully examined the current situation from the viewpoint of preserving a healthy environment for our citizens, we now find it necessary to make the new recommendations as attached to enlist your further cooperation to promote air pollution control measures, etc. at the Isogo Thermoelectric Power Station.

We would be grateful for your reply to our proposals in writing.

Yours faithfully,

Mayor
Yokohama City

Pollution Control Recommendations for Isogo Thermoelectric Power Station of EPDC

1. ■ The EPDC shall make strenuous efforts to improve the quality of the coal used at the Isogo Thermoelectric Power Station. Given the properties of the coal in use, the total SOx emission volume shall be not more than 490 Nm^3/hr at the normal rated load. The stack gas concentration of SOx shall be not more than 350 ppm for both the No. 1 and No. 2 Units.

2. ■ The above thresholds shall be strictly adhered to even when heavy oil is used as auxiliary fuel.

3. ■ Efforts shall be made to further improve the dust collection efficiency of the electric dust collector to improve the emission target level of not more than 0.4 g/Nm^3 in order to reduce the quantities of smoke and soot from the power station.

4. ■ Efforts shall be made to reduce the NOx emission volume by means of improving the combustion system, etc.

5. ■ With regard to the chlorine used for the cooling water, the use of liquefied chlorine shall be terminated as soon as possible for replacement by a safer method, such as the electrolytic method.

Mayor
Yokohama City

Thermoelectric No. 330
February 18, 1972

Dear Mr. Mayor,

Re: Reply to Air Control Measures Proposed for Isogo Thermoelectric Power Station

We are in receipt of your letter (FY 46 No. 702) dated February 15, 1972 and would like to express our gratitude for your continued attention to and consideration of our business.

We are pleased to inform you that the EPDC will adopt the air pollution control measures, etc. recommended in the said letter.

We are always pleased to consult with the Yokohama Municipal Authority on any issue arising from the operation of the Isogo Thermoelectric Power Station and would be most grateful for your continued guidance.

Yours faithfully,

President
Electric Power Development Co., Ltd.

President
Electric Power Development Co., Ltd.

FY 50 No. 1326
March 6, 1976

Dear Mr. ————,

Re: Pollution Control Measures for Isogo Thermoelectric Power Station

The Yokohama Municipal Authority (YMA) would like to express its gratitude for your support and cooperation in various fields of municipal administration.

As you may be aware, the YMA has prepared the Yokohama General Development Plan 1985 with a target year of 1985. This Plan incorporates environmental targets to recover and maintain a healthy and culturally high quality living environment and the YMA is fully prepared to make the maximum efforts to achieve such targets. It is unnecessary to say that a healthy living environment for the citizens of Yokohama must be given the highest priority and that industrial activities will be allowed only as long as they do not invade or destroy the health of the environment.

Based on this understanding, we now find it necessary to request your company's observance of the attached recommendations. We would also like to point out that all previous recommendations remain valid unless otherwise stated.

We would be grateful for your reply to our new proposals in writing.

Yours faithfully,

Mayor
Yokohama City

Attached Paper to Official Letter (FY 46 No. 702) Dated February 15, 1972 from Mayor of Yokohama to President of Electric Power Development Co., Ltd.

1. Air Pollution Control Measures

(1) ■ The EPDC shall make every effort to improve the quality of the coal and heavy oil used to achieve an SOx emission concentration of not more than 60 ppm (converted value to heavy oil of 0.13%). This target shall be met by or at the time of the commencement of the stack gas desulpherisation unit.

(2) ■ Strict maintenance of the electric dust collector and stack gas desulpherisation unit shall be conducted while the dust concentration of the stack gas shall be 0.05 g/Nm3. The time limit for such improvement shall be the same as the time limit for (1) above.

(3) ■ With regard to after-burning following the desulphurisation process of the stack gas, efforts shall be made to minimize the quality of the fuel used. The operating conditions for after-burning shall be decided at a special meeting between the YMA and EPDC.

(4) ■ The EPDC shall conduct research to improve the burning method and/or to develop a stack gas denitration unit to minimize the NOx emission volume. The concrete target figure shall be decided at a special meeting between the YMA and EPDC.

(5) ■ Should the stack gas desulphurisation unit break down or its operation be temporarily halted, the generation load of a corresponding generation unit shall be halved. The sulphur content of the fuel, be it coal or heavy oil, shall be not more than 0.3% while SOx emission volume of the said unit shall be not more than 75 Nm^3/hr. Should there be a possibility of the situation lasting more than 24 hours, the EPDC shall take all necessary measures at the instruction of the YMA.

2. Water Contamination Control Measures

The EPDC shall conduct waste water treatment of the highest standard based on a comprehensive understanding of the state of waste water contamination and shall restore the water quality to the level of industrial water. The EPDC shall also put the following measures into practice with the basic target of recycling the entire waste water volume.

(1) ■ The volume and quality of the waste water from the stack gas desulpherisation unit shall not exceed the threshold values given in Attached Table 1. Within 6 months of the initial commencement of operation, the EPDC shall study the chemical constituents of the waste water from the stack gas desulpherisation unit before and after its treatment and the possible toxic nature of the drained treated water vis-a-vis fish. Should such drainage be found to be inappropriate by the study vis-a-vis the normal life of fish, the quality of such drainage must be purified to the level of permitting normal fish life by the end of 1977 as the target date.

(2) ■ Replenishment water for the stack gas desulpherisation unit shall use the recycled waste water from other processes as much as possible (at least 480 m3/day) by the end of 1977.

(3) ■ Measures shall be adopted to indepen-

dently treat and recycle the entire waste water from the COD removal unit to prevent any external drainage of this waste water.

(4) ■ The discharge volume and quality of all other types of fresh water-based waste water shall not exceed the threshold values given in Attached Table 2 and the quality of the drained water after treatment shall be good enough by the end of 1977 to permit the culture of fish and normal fish life.

(5) ■ Based on special meetings with the YMA, the EPDC shall prepare the Drainage Volume Reduction Plan, designed to recycle the entire waste water from the stack gas desulpherisation unit and also from the power generation processes, and the High Level Treatment Plan incorporating denitration and other improvements in the treatment of waste water by the end of 1977.

(6) ■ Adequate measures shall be taken to prevent temporary drainage at the time of regular repair from adversely affecting the environment and to prevent any inclusion of raw materials, etc. in the drained storm water.

(7) ■ A regime to allow only those chemicals of which the constituents and safety have been established to be used on the premises shall be established by the end of 1977.

(8) ■ Fish cultured under the provision of (4) above shall be thoroughly examined should such examination be deemed necessary, together with analysis of the drainage constituents, toxicity and impacts on the environment in accordance with instructions given by the YMA.

3. Disposal of Industrial Waste

(1) ■ The EPDC shall be responsible for the final treatment or disposal of industrial waste even if it commissions specialized sub-contractors to conduct the said disposal.

(2) ■ Further details of the industrial waste disposal procedure shall be specified in the Waste Disposal Agreement to be separately concluded between the YMA and EPDC.

4. Miscellaneous

(1) ■ Pollution Control Measures to be Adopted by Related Companies

The EPDC shall provide all other companies working for the Isogo Thermoelectric Power Station with appropriate guidance on pollution control. Should any pollution occur which originates from the work of such companies, the EPDC shall make every effort to deal with the situation.

(2) ■ Greening

The EPDC shall plant trees on the premises in accordance with the guidance provided by the YMA.

(3) ■ Suspension of Operation

Should the Isogo Thermoelectric Power Station of the EPDC be found by the YMA to be in violation of any of the above recommendations or should any measure specified in the said recommendations fail or be found likely to fail to prevent environmental deterioration due to the operation of the said power station, the EPDC shall introduce all necessary measures to rectify the situation in accordance with the instructions of the YMA. In particular, should circumstances arise in which the health or living environment of the citizens is actually threatened or likely to

be threatened, the operation of the Isogo Thermoelectric Power Station shall be partially or totally suspended upon the issue of instruction by the YMA to this effect.

Should the YMA find it necessary to implement the necessary measures due to their urgent nature or because of failure on the part of the EPDC to implement such measures, the EPDC shall be held responsible for the payment of all expenses incurred in the implementation of such measures.

(4)■ Measurement and Reporting
The EPDC shall measure the volume and quality of drainage and air pollutants, etc. using methods instructed by the YMA and shall record and store the measurement results and regularly report them to the YMA. The EPDC shall promptly submit all reports and information requested by the YMA for pollution control purposes.

In principle, all records and information reported to the YMA shall be made open to the public by the YMA except in special circumstances.

(5)■ Meeting to Review Recommendations
A meeting to review the above recommendations shall be held as and when deemed necessary between the YMA and EPDC to secure a better environment or to achieve environmental targets.

Attached Table A-1: Water Quality Standards for Waste Water from Stack Gas Desulphurisation Unit

Total Volume	COD	BOD	SS
700 m^3/day	10 mg/l	10 mg/l	10 mg/l

Notes:

1) Figures indicate the maximum thresholds.

2). These standards shall apply to the No. 2 Unit from 6 months after commencement of its operation.

Attached Table A-2: Water Quality Thresholds for Fresh Water Based Waste Water (Excluding that Dealt with by Above Table 1)

Total Volume from Generating Processes	Total Volume of Sanitary and Other Waste Water	COD and BOD	Ss	Oil Content	Other Pollutants
550 m^3/day	120 m^3/day	5 mg/l	5 mg/l	1 mg/l	not exceeding the levels of industrial water

Notes:

1) Figures indicate the maximum thresholds.

2) Time limit to achieve targets: December 31, 1977.

Table 18-1 shows the major contents changed in the pollution control agreements.

Table 18-1: Changes of Pollution Control Agreement between Yokohama City and Isogo Thermal Electric Power Station, Electric Development Co.

		December 1964 (New Construction)	July 1967 (Extension)	February 1972	March 1976
Air Pollution	Dust collector	Removal rate should be more than 98%	Removal rate should be more than 98% by electric dust collection	Removal rate should be more than 98% by electric dust collection	Removal rate should be more than 98% by electric dust collection
	Smoke stack	120m in height	More than 140m in height	More than 140m in height	More than 140m in height
	velocity of emission	30m/sec	More than 30m/sec	More than 30m/sec	More than 30m/sec
	Emission amount	-	-	Less than 490Nm^3/h (SOx)	Less than 490Nm^3/h (SOx)
	Emission temperature	More than 130C	More than 130C	More than 130C	More than 130C
	Fuel	Low sulfur and low ash	Low sulfur and low ash	Low sulfur and low ash	Less than 0.13% (Sulfur content of heavy oil *equivalent*)
	Soot & Smoke	Less than 0.6g/Nm^3	Less than 0.6g/Nm^3	Less than 0.4g/Nm^3	Less than 0.05g/Nm^3
	SO2	Less than 500ppm	Less than 500ppm	Less than 350ppm	Less than 60ppm - Installation of blue gas desulfurization facility - Reduction of fuel consumption of afterburner - Measures to be taken in case of desulfurization facility failure
	NOx			Reduction through improvement of combustion method	- Improvement of combustion method - NOx reduction through research on stack gas denitration facility

Table A-18-1: Shows the major contents changed in the pollution control agreements.

Annex 19: Profitable Investment in New Production Technology and Pollution Control: An Edible Oil Manufacturer

The following table shows the case of a company which produces salad oil, other types of edible oil and margarine from rapeseed, sesame and soybeans. The company invested in new technology that contributed to a reduction of energy consumption and manpower requirements, and therefore reduced production costs. At the same time it reduced emission of pollutants such as NOx, phosphorus, and dewatered sludge cake. This company made investments in new production technology after a thorough feasibility study on the investments.

Table A-19-1: Costs and Benefits of Environmental Investment in Edible Oil Manufacture

Equipment and Systems Invested	Annual Benefits (1)	Annual Costs Arising from Investments (Depreciation, Operation & Maintenance and Interest Payment) (2)	Annual Net Benefits (1)-(2)=(3)
1. New boiler with Improved combustion system, and computerization	a. NOx emission reduction by 25%	70 million yen	NOx emission reduction by 25%
	b. 100 million yen cost reduction through saving of fuel, electricity and labor costs		30 million yen net cost saving
2. New materials processing systems	a. Reduction of phosphorus by 50%		Reduction of phosphorus by 50%
	b. 240 million yen cost reduction through reduction in effluent treatment, chemicals, and labor costs	140 million yen	100 million yen net cost saving
3. New dewatering machine, measurement, monitoring system	a. Reduction of dewatered sludge cake by 60%	5 million yen	Reduction of dewatered sludge cake by 60%
	b. Improvement in work environment and operation		Improvement in work environment and operation
	c. 16 million yen cost saving thorough reduction of sludge treatment and labor costs		11 million net cost saving

Source: Case Studies

Source: Case Studies

Errata

Table of Contents, Annexes begin on page 133.

Page 45, Figure 4.4, top box should read "Complaint."

Page 137, photo captions 3 and 4 should be interchanged. Captions on following three pages should be sequential.

Annex pages 15-1 through 15-7, bottom footer should read "Annex 15."