Lessons from Minamata Disease and Mercury Management in Japan

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Ministry of the Environment, Japan

This booklet is edited and published by Ministry of the Environment of Japan in cooperation with related bodies in order to share the lessons learned from Minamata Disease and the knowledge on mercury management in Japan with other countries. An English version (provisional translation) is published for the distribution at the second session of Intergovernmental Negotiating Committee to prepare a global legally binding instrument on mercury (INC2), and other UN language versions will be made available at INC3 and afterwards.

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Introduction

Purpose of this Document

Mercury is being discharged from various sources to the environment, causing much concern in regard to global-scale environmental pollution and damage to human health. In 2002, the United Nations Environment Programme (UNEP) published the Global Mercury Assessment Report and began the Global Mercury Programme in the following year to prevent mercury pollution. Based on the discussion by that time, the 25th Session of the UNEP Governing Council held in February 2009 adopted a decision to elaborate a legally binding instrument to reduce risks posed by mercury and to convene an intergovernmental negotiating committee (INC) commencing its work in 2010 with the goal of completing it in 2013. The first meeting of the INC (INC 1) was convened in Stockholm in June 2010 to begin the negotiations.

In Japan, the restored national economy from its state of devastation at the end of the war in 1945 entered a period of high economic growth in the 1960s and chemical and heavy industries rapidly advanced. Intense production activities without due consideration of the environment resulted in a rise of various pollution issues, including damage to human health. The legal system at that time was inadequate to prevent the occurrence and spread of serious pollution.

Minamata Disease, the existence of which was officially acknowledged by the government in 1956, is a typical pollution-related problem caused by effluent containing methylmercury from chemical plants. The extent and severity of health damage as well as destruction of the natural environment caused by such environmental pollution were unprecedented in human history. This marked a turning point for Japan's recognition of the critical importance of anti-pollution measures, prompting the development of new policies and technologies for environmental protection. In the case of Minamata Disease, however, the initial delay of the introduction of appropriate measures led to a further spread of the damage. The companies held responsible continue to pay huge amounts of compensation, while the government also continue to implement wide-ranging measures to deal with the aftermath of the pollution. The entire incident constituted a bitter lesson for the government.

In subsequent years, stronger environmental protection measures were gradually introduced in Japan, including mass legislation and the revision of 14 laws during the so-called "Pollution Diet Session" in 1970. At present, there are many initiatives and approaches to prevent environmental destruction and health damage with the involvement of the national and local governments, industries and citizens' groups. Japan has been actively engaged in international cooperation to contribute to the prevention of pollution damage in other countries based on its own past experiences and lessons learned.

This document intends to facilitate among its readers the understanding of the importance of mercury management by describing the seriousness of the damage caused by pollution when an actual problem, such as Minamata Disease, occurs. The document describes Japan's experiences and lessons learned as well as measures and initiatives which have been implemented to reduce the risks posed by mercury.

(Note) This document serving as a reference material has been compiled by Ministry of the Environment (MOE) and every effort has been made to present unbiased contents. However, it must be noted that there are some opinions that may differ from those expressed in this document.

Contents of this Document

The document contains the following information.

Part 1 Experiences and Lessons from Minamata Disease
Part 2 Mercury Management in Japan
Part 3 Promotion of International Cooperation

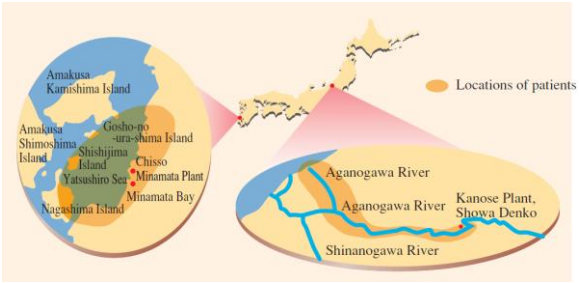
Part 1 Experiences and Lessons from Minamata Disease

What is Minamata Disease?

Minamata Disease is a toxic nervous disease caused by eating seafood contaminated with methylmercury compounds discharged from the Minamata plant (in Kumamoto Prefecture) of Shin-Nippon Chisso Hiryo K.K. (subsequently renamed “Chisso Corporation” at a later date, hereinafter referred to as “Chisso”) or the plant of Showa Denko K.K. (hereinafter referred to as “Showa Denko”) in Kanose Town (presently named Aga Town), Niigata Prefecture (See Fig. 1 and Fig. 2).

Its major symptoms include sensory disturbance, ataxia, concentric constriction of the visual field, and auditory disorders. If a mother is highly exposed to methylmercury during pregnancy, her baby might suffer from fetal Minamata Disease, which sometimes shows different symptoms from the adult one.

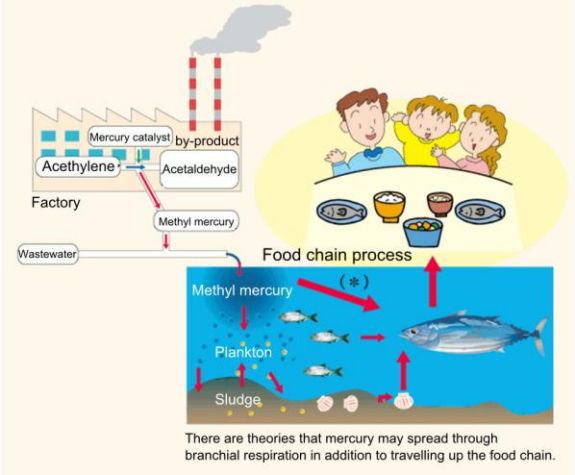
Fig. 1 Location of Minamata Disease Patients



Source: Ministry of the Environment (MOE)

(Note) The above conceptual map is not exhaustive and it should not be interpreted that there is no possibility of victims of Minamata Disease outside the heavily coloured areas.

Fig. 2 The Route of Methyl Mercury



Source: MOE

Emergence and Expansion of Minamata Disease

All pollution requires scientific investigation to determine the cause. The history of Minamata Disease, from its official acknowledgement in 1956 to the final identification of its cause in the form of a consensus opinion of the government issued in 1968 is described next along with the background of these events.

Official Acknowledgement of Minamata Disease

In April 1956, a young girl living in the Tsukinoura District of Minamata City was hospitalised at the Chisso Minamata Plant Hospital complaining of severe numbness of the limbs, inability to speak and inability to eat. Director Hosokawa at the hospital took the matter seriously and notified this case in the Tsukinoura District of a serious brain disorder due to an unknown cause to the Minamata Health Centre on May 1 of the same year. This notification constituted the "official acknowledgement of Minamata Disease".

Initial Response

Following its official acknowledgement, the Health Centre, local medical association, municipal hospital, Chisso Minamata Plant Hospital and Health Section of Minamata City jointly established the Committee for Countermeasures Against Strange Disease in Minamata City. Other efforts to investigate the disease

also began, including requested research by the Kumamoto Prefectural Government to the University of Kumamoto and the setting up of the Health Science Research Team by the Ministry of Health and Welfare (MHW; presently the Ministry of Health, Labor and Welfare (MHLW)).

At the early stage, an infectious disease or similar was thought to be the possible cause. In March 1957, the Team of the MHW reported: "Poisoning by eating fish or shellfish caught in Minamata Bay is suspected as the most likely cause at present. It is not yet known which toxic substance has caused the pollution of fish or shellfish, but a type of chemical substance or metal is believed to be the most likely cause".

Because of this suspicion that the eating of fish or shellfish caught in Minamata Bay was the cause of the disease, the Fishermen's Cooperative in Minamata City voluntarily restrained from fishing in Minamata Bay in August 1957 on the administrative guidance of the Kumamoto Prefectural Government. By this time, the Kumamoto Prefectural Government had decided to opt for a policy of the total prohibition of fishing in Minamata Bay with the application of the Food Sanitation Act and requested the MHW to decide on the legality of this policy in August 1957. The response by the MHW was that the said policy could not be legally enforced as there was no clear evidence of the toxic contamination of all fish and shellfish in a specified area of Minamata Bay.

The background for this response was uncertainty regarding the cause while the Team of the MHW was focusing on selenium, manganese and thallium as the casual substance.

Half Measure Investigation of the Cause

In September 1958, Chisso changed the discharge system for plant effluent from the acetaldehyde manufacturing process. Before this change, effluent was discharged directly to the Port of Hyakken in Minamata Bay. Under the new system, effluent was stored in the Hachiman Pool prior to discharge of the supernatant to the mouth of Minamata River. However, this new system led to the emergence of new patients near and north of the river mouth from March of the following year. In October 1959, the Ministry of International Trade and Industry (MITI; presently the Ministry of Economy, Trade and Industry (METI)) instructed Chisso to remove the new drainage channel, and discharge from the Hachiman Pool to the mouth of Minamata Rive was stopped in the following November.

In July 1959, the Minamata Disease Study Team of the Faculty of Medicine, University of Kumamoto reported that it had reached the conclusion that the substance causing Minamata Disease was a mercury component, most likely an organomercury compound. Some scientists, however, did not support this organic mercury theory.

At the Ministerial Liaison Conference on Countermeasures for the Minamata Food Poisoning held on November 11, 1959, a researcher from the University of Kumamoto reported the suspicion of organomercury poisoning caused by the plant effluent. Some of the participants pointed out that no similar disease had been reported in connection with effluent from other similar chemical plants and that the process of inorganic mercury changing to organic mercury was not clearly established. The Food Sanitation Investigation Council which met on the following day simply returned its verdict to the Minister of Health and Welfare that the main cause of Minamata Disease was likely to be some kind of organomercury compound without mentioning the original source of pollution.

The Special Committee on the Minamata Food Poisoning which had been set up under the Food Sanitation Investigation Council in January 1959 to investigate the cause of Minamata Disease was dissolved on November 13 of the same year.

Subsiding of the Problem

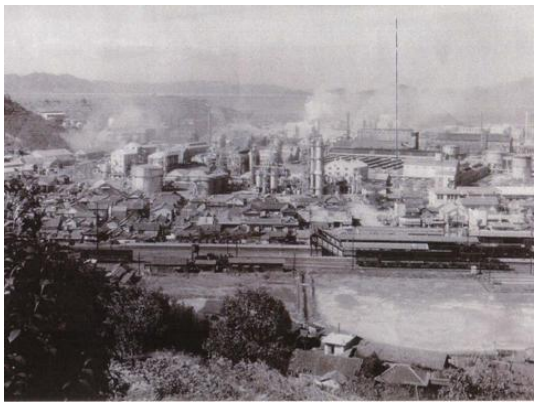
Following the presentation of the organomercury theory by the University of Kumamoto, local fishermen

demanded that Chisso install a complete treatment system for plant effluent and suspend operation until the installation of such a system. Meanwhile, patients of Minamata Disease organized sit-ins in front of the main gate of the Chisso Minamata Plant, demanding compensation.

The MITI gave a guidance to Chisso in October 1959 to install a plant effluent treatment system, and Chisso completed the installation of a coagulation sedimentation system on December 19, 1959. With the reporting of the completion of the plant effluent treatment system by the mass media, there was rising local expectation of the treatment of the effluent by this system. However, it was later discovered that the system was not designed to remove mercury and was useless for the removal of methylmercury compounds in the effluent.

Some movement was made in December 1959 regarding the issue of compensation. A compensation agreement for fishermen was reached on December 25, 1959 between Chisso and the Federation of Fishermen's Cooperatives in Kumamoto Prefecture with the help of the Arbitration Board for Fisheries Disputes in the Shiranui Sea, members of which included the Governor of Kumamoto Prefecture and the Mayor of Minamata City. The same Arbitration Board also helped with the signing of the so-called consolation payment agreement between Chisso and the Mutual Help Group of Households with Minamata Disease Patients. One clause of this agreement stated that recipients of this payment would not demand further compensation even if Minamata Disease was found to be caused by effluent from the Chisso Plant in the coming years.

The installation of the coagulation sedimentation system, fisheries compensation payment and consolation payment to patients eased the intensity of the local dispute on Minamata Disease by December 1959, and the problem of Minamata Disease ceased to be a major topic of social concern without clarification of its cause. Although the research by the University of Kumamoto to investigate the cause continued, hardly any progress was made regarding control or prevention measures by the governments until the outbreak of the same disease in Niigata Prefecture in 1965.



Chisso Minamata Factory (1959)
Photograph: Minamata Disease Municipal Museum

Outbreak of Niigata-Minamata Disease to Consensus Opinion of the Government

On May 31, 1965, Professor Tsubaki and other staffs of the University of Niigata reported to the Health Department of the Niigata Prefectural Government that patients suspected to be organomercury poisoning appeared in Niigata. In June 1965, the Niigata Prefectural Government established the Research Headquarters for Mercury Poisoning in Niigata Prefecture and conducted a health survey on people living in the Agano River basin with the cooperation of the University of Niigata and others. The Special Investigation Team on Mercury Poisoning in Niigata set up by the MHW in September of the same year submitted its report to the Ministry in April 1967. This report claimed that effluent from a plant of Showa Denko was responsible for the disease based on epidemiological study results and other data even though the company blamed agrochemicals for the cause.

On September 26, 1968, the MHW and the Science and Technology Agency announced the consensus opinion of the government that Minamata Disease in Kumamoto Prefecture was caused by "a methylmercury compound generated by the acetaldehyde and acetic acid manufacturing facilities" at the Chisso Minamata Plant and that the same disease observed in Niigata Prefecture was caused by "a methylmercury compound generated as a by-product of the acetaldehyde manufacturing process" at the local Showa Denko Plant.

Lessons Learned from Expanded Damage by Minamata Disease

The late 1950s saw an outbreak of Minamata Disease and early attempts to control the disease. In around November 1959, the governments should have recognized (even though it could not be concluded with certainty) that Chisso was highly likely to be discharging organomercury compounds, the causal substance of Minamata Disease. However, the governments failed to prevent damage by Minamata Disease from increasing. Because of this, the damage by Minamata Disease expanded during the period of high economic growth which began in 1960. Chisso produced acetaldehyde, a material used for plastics and other plasticizers; Chisso's production of acetaldehyde was the largest in Japan, and large amount of mercury was used for the production process. In addition, the Chisso Minamata plant played an important role in the local economy with regard to job opportunities and tax revenue.

Chisso ended the manufacture of acetaldehyde which was responsible for Minamata Disease in May 1968, 12 years after the official acknowledgement of the disease. One estimate put the amount of mercury, including methylmercury compounds, discharged during this period at some 80 - 150 tons. As a result, new victims were identified. This was probably because policymakers at that time were worried about the possible negative impacts of stopping acetaldehyde production on Minamata's local economy and Japan's high economic growth. Even taking historical and social conditions at the time into consideration, the governmental failure to prevent harmful impacts on human health from increasing, due to not taking strict measures against the responsible companies for a long time, still provides valuable lessons today; it shows how important it is to take countermeasures quickly as well as how preventive countermeasures should be taken even when there is scientific uncertainty over the cause of the problem.

[Column 1] Amount of Damage by Minamata Disease and Cost of Pollution Control Measures

Environmental pollution by toxic substances results in serious damages such as health damage and destruction of the living environment. From the instance of Minamata Disease Japan has learned such lessons as the activities that give priority to economic goals but lack proper attention to the environment do various and serious damages such as health damage, and as it is not easy to recover from the damage later on. From the economic standpoint, it is clear that these activities are not economic choice because the measures against these damages take a large amount of cost and a great deal of time in comparison with the cost of the case that such measures are taken to prevent pollution.

The table below shows the results of the comparative analysis of the amount of damage caused by Minamata Disease and the pollution control measures implemented in and around Minamata Bay. This analysis was conducted in 1991 right before the Rio Summit (UN Conference on Environment and Development). The amount of the damage is likely to be much larger if it is calculated today.

Comparison of the Cost of Damage Caused by Minamata Disease in the Area Around Minamata Bay to the Cost of Pollution Control and Preventive Measures

Cost for Pollution Control and Prevention Measures *Yearly average paid by Chisso Co.,Ltd., in the form of investments to control pollution*		123,000,000 yen/year
Total damage amount		12,631,000,000 yen/year
	Health damage *Yearly average of compensation benefits paid to patients under the Compensation Agreement*	7,671,000,000 yen /year
	Environmental pollution damage *Yearly average amount of expenditure for dredging work in Minamata Bay.*	4,271,000,000 yen /year
	Fishery damage *Compensation paid to the fishery industry computed as equal redemption of principal and interest prorated as yearly payment.*	689,000,000 yen /year

Source: “Pollution in Japan - Our Tragic Experiences”, edited by Study Group for Global Environment and Economics, 1991

Remedies for the Damage by Minamata Disease

Outline of Relief Programs for Minamata Disease Victims

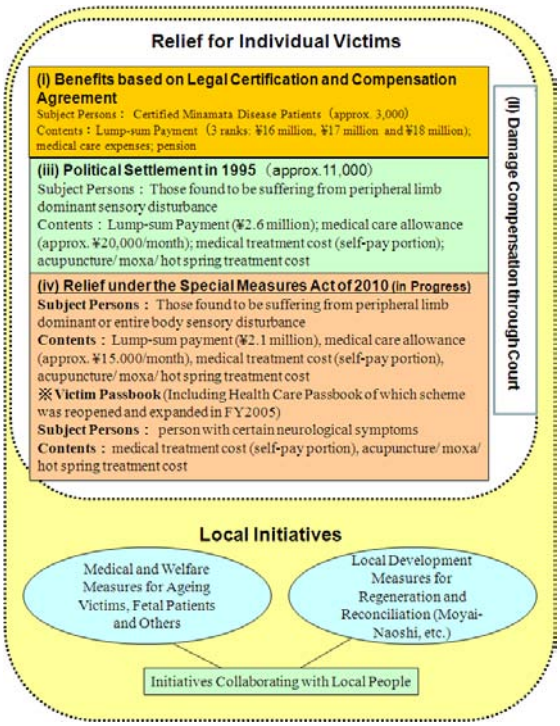
The types of damage caused by methylmercury discharged by the responsible companies are (1) health damage to individual persons; (2) environmental pollution, including fish and shellfish; and (3) exhaustion of a local community due to discrimination of the victims and conflicts among local residents.

The history of the relief measures for the health damage to individual persons is described below along with the background and status of these measures.

Based on a series of relief measures for the victims of Minamata Disease introduced over many years, there are currently four relief systems operating side by side. While the details of these systems are explained later, they are briefly (i) compensation based on a compensation agreement for certified victims under the

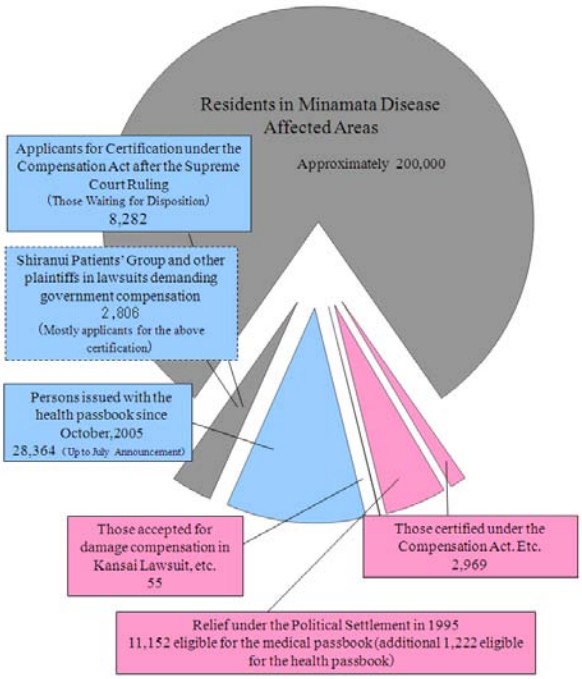
law, (ii) successful claims for compensation through the court, (iii) compensation following the political settlement (further details on pages 9-10) in 1995 and (iv) ongoing subsidy for medical expenses as instituted after the Supreme Court ruling in 2004 and relief measures by a cabinet decision in 2010 based on the Act on Special Measures Concerning Relief for Victims of Minamata Disease and Solution to the Problem of Minamata Disease enacted in 2009 (Fig. 3 and Fig. 4).

Fig. 3 Outline of Relief Programs for Minamata Disease Victims



Source: MOE

Fig. 4 Spread of the Problem of Minamata Disease



Source: MOE

*As of the end of July 2010. Although the figures subsequently changed, this was the peak time for the number of living applicants for certification (those waiting for disposition) under the Act for Compensation for Health Damage by Pollution. The figures at that time are used here.

** Those who applied for certification under the Act mentioned above prior to the Supreme Court Ruling and neither certified nor rejected are 19 in number.

Statutory Patient Certification Program and Compensation Agreement

(1) Certification of Minamata Disease Patients Under the Relief Act

In December 1969, the Act on Special Measures Concerning Relief for Health Damage by Pollution (Act No. 90 of 1969; hereinafter referred to as the "Relief Act") was enforced to implement emergency measures for the relief of health damage. While the scope of the Relief Act includes asthma caused by air pollution and other pollution-related illnesses, the Relief Act specifies that patients of Minamata Disease should receive payments to cover their medical expenses, etc. on their certification by the prefectural governor or city mayor concerned. This certification was based on the opinions of a certification council consisting of medical experts.

(2) Compensation for Certified Patients Based on the Compensation Agreement

Lawsuits requesting compensation for damage caused to Minamata Disease patients by offending enterprises were filed in Niigata (1967: the first Niigata Minamata Disease lawsuit) and Kumamoto (1969: the first Kumamoto Minamata Disease lawsuit). Both the ruling for the former in 1971 and the ruling for the latter in 1973 upheld the rights of the patients to receive compensation for damage from Showa Denko and Chisso respectively. All of the plaintiffs in the first Kumamoto lawsuit were certified Minamata Disease patients, and after this ruling, they joined with a group of other certified patients which had been conducting independent negotiations with Chisso for a fresh round of compensation negotiations. In July 1973, a compensation agreement was concluded between Chisso and the expanded group of patients. This agreement stipulated that each certified patient would receive a consolation payment (lump sum payment of ¥16 million, ¥17 million or ¥18 million depending on the certified rank of damage), medical expenses and an annuity and that the agreement would apply to patients certified after the date of the signing of the agreement if they hoped. A similar agreement was concluded for patients of the Niigata Minamata Disease. All certified patients have subsequently received compensation based on the compensation agreement.

（Note）In the case of those for which methylmercury was acknowledged as the cause of the damage by the Supreme Court ruling in 2004, Chisso as a causative party paid an amount of compensation based on this ruling. As this amount was below the level of compensation under the compensation agreement, some plaintiffs filed a new lawsuit demanding that Chisso pay an amount of compensation based on the said agreement.

(3) Clarification of the Certification Criteria and Expansion of the Certification Capacity

The number of applications for the certification based on the law rapidly increased after the conclusion of the compensation agreement. The Environment Agency which was established on July 1, 1971 (presently the Ministry of the Environment (MOE)) began to clarify the certification criteria and to expand the certification capacity for the appropriate and smooth implementation of the Minamata Disease certification work.

Firstly, the certification criteria under the Relief Act were clarified based on the understanding that persons whose likelihood of actually suffering from Minamata Disease was equivalent to or higher than the likelihood of not actually suffering from the disease (i.e. a likelihood of suffering from Minamata Disease of 50% or more) in view of the available medical knowledge would be continually certified as Minamata Disease patients pursuant to the "On Certification Under the Relief Act" (Notification by the Vice-Minister of the Environment Agency in August 1971). Because of its non-specific symptoms, the diagnosis of Minamata Diseases by sole symptom poses a difficulty. Therefore, actual certification under the Relief Act was based on a combination of several main symptoms. The certification system under the Relief Act and the associated medical judgment method were inherited by the Act Concerning Compensation and Prevention of Pollution-Related Health Damage (Act No. 111 of 1973; hereinafter referred to as the "Compensation Act") which was enforced in September 1974. Later in July 1977, the Environment Agency issued the "Certification Criteria for Acquired Minamata Disease" as a notification by the Director General of the Environmental Health Department (hereinafter referred to as the “1977 Criteria"), clarifying the combination of symptoms and others to be used for medical judgment in the certification process.

In regard to expansion of the certification capacity, the Act on Temporary Measures Concerning Facilitation of the Certification Work for Minamata Disease (Act No. 104 of 1978) was enforced in February 1979 to deal with the rapid increase of applicants for the certification. It was decided that some applicants registered by September 1996 would be processed by the national government.

As of the end of July 2010, the aggregate number of certified patients is 2,969 (1,780 in Kumamoto Prefecture, 491 in Kagoshima Prefecture and 698 in Niigata Prefecture), of which 776 (400 in Kumamoto Prefecture, 161 in Kagoshima Prefecture and 215 in Niigata Prefecture) are still alive.

(Note） The certification criteria currently in place are criticised by some for being "too narrowly defined".

(4) Support for Chisso

With the increase of applicants for the certification, the number of certified patients increased even though many applicants were rejected. This situation made it difficult for Chisso to pay the compensation

stipulated by the compensation agreement solely based on its business profits. In 1978, the Kumamoto Prefectural Government adopted a scheme designed to financially support Chisso to prevent them from becoming unable to pay compensation to patients because of its cash flow problem. This support programme involved a loan for Chisso to pay the said compensation, and the original funds for this loan were raised through the issue of prefectural bonds. The total value of the bonds issued under this programme stands at approximately ¥226 billion.

This financial support programme for Chisso using money raised by prefectural bonds was abolished by a cabinet approval of "Support Measures for Chisso from FY 2000 Onwards" (hereinafter referred to as the "2000 Cabinet Approval") in February 2000. The newly established programme is fundamentally different in that Chisso is required to firstly pay compensation for patients from its current profits and to repay as much of the loan as possible to the prefectural government using a subsidy from the general account of the national government and money allocated through the financial support measures for local governments by the national government*. Under the new arrangement, some ¥58 billion of subsidy and some ¥14.5 billion of the financial support for local governments have been disbursed as of the end of FY 2009.

(Note) *Financial support measure for local governments by the national government: Special prefectural bonds are issued to repay the loan made by the Kumamoto Prefectural Government to Chisso, and the money required for repayment of the interest and principal of these special bonds is given to the prefectural government as part of the national taxes allocated to prefectural governments. These special bonds are subscribed by the national government.

Political Settlement in 1995

(1) Events Leading to Political Settlement

The continued application and re-application for the certification under the Compensation Act and many lawsuits for compensation for damage made Minamata Disease a major social issue. The report "Desirable Future Measures to Deal with Minamata Disease" compiled by the Central Council for Environmental Pollution Control indicated the need to introduce administrative measures to deal with health problems. Such recommendation was based on the fact that some local people held anxiety caused by the self-diagnosis of symptoms as those of Minamata Disease because they had observed the state of Minamata Disease patients at first hand even though they were not certified as patients of Minamata Disease, and the consensus that human exposure to different degrees of methylmercury had taken place in areas of Minamata Disease. .

In response to this report, the Comprehensive Programme to Address Minamata Disease was introduced. The programme had two schemes: (i) medical treatment scheme where a medical treatment passbook was issued to those people found to be suffering from peripheral limb dominant sensory disturbance (which is also a symptom of Minamata Disease) so that the self-pay portion of the medical treatment cost could be paid along with the payment for medical care and other benefits (application period: April 1992 to March 1995) and (ii) health care scheme involving health checks for local people and other activities.

The strife and confusion regarding the situation surrounding Minamata Disease continued as there were many lawsuits and so on brought by those whose application for certified patient status under the Compensation Act had been rejected. With the intention of breaking the deadlock and facilitating an amicable settlement between the parties concerned, the three ruling parties (Liberal Democratic Party, Japan Socialist Party and New Party Sakigake), listening to the opinions from national and prefectural governments concerned, put forward a solution for a full and final settlement in September 1995. By December of the same year, both the groups of victims and companies involved (Chisso and Showa Denko) had accepted this proposal and signed an agreement to settle the dispute.

(2) Outline of Political Settlement in 1995

The political settlement which was reached in 1995 had three main components designed to settle all disputes over Minamata Disease swiftly, finally and completely. These components were (i) a lump sum payment of ¥2.6 million for each person satisfying certain requisites, such as suffering from peripheral limb dominant sensory disturbance which is considered to be one symptom of Minamata Disease, and an additional payment to groups of patients (¥4.94 billion by Chisso to five groups and ¥440 million by Showa Denko to one group), (ii) expression of regret or responsible attitude by the national government as well as prefectural governments concerned and the issue of a medical care passbook as well as

payment of the medical treatment cost, medical care allowance and other benefits to those relieved under (i) above, and (iii) ending of disputes, including lawsuits, by those accepting the relief measures.

The scope of people eligible for the relief specified in (i) above was expanded to cover those newly judged to be eligible for a medical care passbook in addition to those already eligible for the medical treatment passbook mentioned earlier. The reason for this was that requests for relief by people whose application for certified patient status had been rejected were judged to be understandable given the fact that the rejection of their application for certified patient status under the Compensation Act did not necessarily mean the non-existence of an impact by methylmercury because of the dependence of the diagnosis of Minamata Disease on the level of probability in each case.

The settlement also required the national and prefectural governments to issue a health care passbook which pays the medical treatment cost to some extent to those found ineligible for the medical care passbook but who suffering from certain neurological symptoms.

(3) Implementation of Political Settlement Agreed in 1995

Based on the consent of all parties concerned, the Cabinet approved the "Measures to Deal with Minamata Disease" in December 1995, and the national and prefectural governments implemented the following measures.

1. The business of accepting applications under the comprehensive medical care programme was restarted in January 1996 until July of the same year. During this period, 11,152 people were found to be eligible for the medical care passbook (i.e. eligible for the lump sum payment, payment for medical care and the subsidy for the self-pay portion of the medical treatment cost) while 1,222 people were found to be eligible for the health care passbook (i.e. eligible for the subsidy for the self-pay portion of the medical treatment cost).
2. A support measure for Chisso was introduced whereby the lump sum payments and additional payments to be made by Chisso would be financed by a fund to be established by the Kumamoto Prefectural Government. (85% of the capital contribution to this fund would be made in the form of a national government subsidy, and the remaining 15% would come from prefectural bonds. In regard to the some ¥27 billion national government subsidy, the Cabinet approved the release of Chisso from its obligation for loan repayment in 2000, through making it unnecessary for Chisso to repay the government subsidy portion of the fund.)

Following the implementation of these measures based on the cabinet approval by the national and prefectural governments concerned, the plaintiffs of the 10 lawsuits for compensation for damage withdrew their actions in May 1996, leaving on the Minamata Disease Kansai lawsuit unsettled.

Judicial Damage Compensation

Among the lawsuits for compensation for damage after the first Niigata lawsuit and the first Kumamoto lawsuit, the final rulings were made for the second Kumamoto lawsuit (in 1985) and the Kansai lawsuit (2004) which remained unsettled after the political settlement in 1995. These rulings upheld the entitlement of those who had not been certified as Minamata Disease victims in the light of the certification criteria adopted by the Compensation Act to compensation for damage ranging from ¥4 million to ¥10 million per person based on different viewpoint from that under the Compensation Act (1977 Criteria).

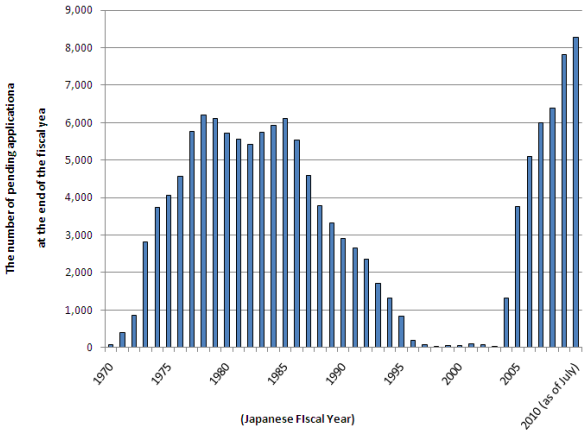
More Recent Measures

On October 15, 2004, the Supreme Court handed down its ruling on the Kansai lawsuit. This ruling was decided from a viewpoint different from that of the Compensation Act and found 51 people to be entitled to compensation for damage caused by methylmercury poisoning. The ruling also found the national government and the Kumamoto Prefectural Government jointly liable for the payment of one-quarter of the compensation in view of their failure to prevent the outbreak and spread of Minamata Disease, upholding the governments liability for the payment of compensation along with Chisso. After this Supreme Court

ruling, the number of applicants for certified patient status based on the Compensation Act sharply increased, creating the new political challenge of properly dealing with these applicants (Fig. 5).

On the same day that the Supreme Court handed down its ruling, the Minister of the Environment released a statement saying "We are truly sorry for the failure to prevent the spread of damage ... I would like to express my sincere apologies to the many people who have suffered excruciating pain beyond description for many years".

Fig. 5 Transition in the Number of Pending Applications for Certified Minamata Disease Patient



(Note) The figure of 2010 is the number of pending applications as at the end of July
Source: MOE

(1) On Future Minamata Disease Countermeasures Announced in April 2005

On April 7, 2005, MOE announced the Future Minamata Disease Countermeasures to further improve the medical treatment and to facilitate regeneration and reconciliation in areas affected by Minamata Disease to enable all victims to live in the community without worry. This policy document had the following contents and took the forthcoming opportunity of the 50th anniversary of the official acknowledgement of the disease in 2006. It also followed the path created by the political settlement in 1995 and the Supreme Court ruling on the Kansai lawsuit in 2004.

(i) Reopening and Expansion of the Comprehensive Medical Treatment Programme

The comprehensive medical treatment programme which had been implemented from the viewpoint of facilitating environmental health administration in collaboration with the prefectural governments concerned was expanded in view of the aging of the patients and various challenging issues which had surfaced in the process of implementation of the past programme. In regard to the health care passbook in particular, it was decided that the government would cover the self-pay portion of medical expenses in full. Accordingly, the facility to receive applications for the issue of a new health care passbook with an expanded range of benefits was re-opened on October 13, 2005 (this facility was closed at the end of July 2010).

As of the end of July 2010, the number of people (living) covered by the programme is 7,262 (5,328 in Kumamoto Prefecture, 1,605 in Kagoshima Prefecture and 329 in Niigata Prefecture) for the medical care passbook and 28,856 (23,481 in Kumamoto Prefecture, 5,174 in Kagoshima Prefecture and 201 in Niigata Prefecture) for the health care passbook. Among these, 28,369 people (23,099 in Kumamoto Prefecture, 5,077 in Kagoshima Prefecture and 193 in Niigata Prefecture) had been newly issued with the health care passbook by the end of July 2010 following their application after the reopening of the relevant facility mentioned above.

(ii) New Initiatives to Serve Local Communities

New initiatives to serve local communities commenced in FY 2006, including (a) enhanced health care and welfare measures in the facing of the aging of the victims and their families and (b) support for the social activities of secondary patients who acquired the disease at the fetal stage and other victims of Minamata Disease.

Since the Supreme Court ruling in 2004, 8,282 people have applied for certification under the Compensation Act, and 2,806 people (most of them are applicants for certification under the Compensation Act) have filed a lawsuit for compensation for damage, etc. against Chisso, the

national government and the Kumamoto Prefectural Government. This situation is considered to not only reflect the increasing need for medical treatment and other measures with the aging of the victims but also indicates the depth and spread of the problem of Minamata Disease.

(2) Special Relief Act of July 2009

In response to the increased number of people requesting new relief measures, the government began the process of establishing new concrete relief measures for Minamata Disease victims, leading to the promulgation and enforcement of the Act on Special Measures Concerning Relief for Victims of Minamata Disease and Solution to the Problem of Minamata Disease (Act No. 81 of 2009; hereinafter referred to as the "Special Relief Act") in July 2009 based on an agreement reached by the Democratic Party, Liberal Democratic Party and Komeito.

The Special Relief Act aims at finally settling the problem of Minamata Disease including ending disputes in the areas, protecting the environment and realising a society in which people can live with peace of mind. The Act intends to achieve this through legal scheme which recognises those people who do not meet the certification criteria under the Compensation Act but still require relief as Minamata Disease victims and provides for relief. To be more precise, the Act indicates the principles for the provision of relief and solving of the problem of Minamata Disease and stipulates the need to provide relief for all people who should receive relief through the establishment of implementation policy for relief measures and the implementation of initiatives designed to solve the problem of Minamata Disease (implementation of relief measures, facilitation of disposition regarding applications for certification of Minamata Disease patient status and settlement of disputes surrounding Minamata Disease). The Act also demands a review of the business mode of insolvent offending enterprises which have been receiving public aid so that relief is funded by offending enterprises.

(3) Cabinet Decision on Implementation Policy for Relief Measures of April 2010

After the enactment of the Special Relief Act, settlement talks were held with some groups which had filed a lawsuit earlier. Both the plaintiffs and defendants accepted the opinion expressed by the Kumamoto District Court in March 2010, and a basic agreement for an amicable settlement was reached. (A similar basic agreement was reached at the Niigata District Court in October and at the Osaka District Court and Tokyo District Court in November of the same year.)

Meanwhile, in April 2010, the Cabinet decided on the implementation policy for relief measures stipulated by the Special Relief Act. This policy clarifies the requisites of people to qualify for relief measures, the judgement method and the application period in order to facilitate the relief for Minamata Disease victims. It also stipulates that (i) Chisso, etc. shall make a lump sum payment (¥2.1 million) per person and an additional payment (¥3.15 billion) for three groups, (ii) the national government and prefectural governments concerned shall pay the medical care cost, medical care allowance and other benefits where appropriate for each person eligible for the lump sum payment referred to in (i) above and (iii) the national government shall issue the Minamata Disease victim passbook to those people whose sensory disturbance is not as bad as the level eligible for the lump sum payment and who are suffering from symptoms shared by Minamata Disease, such as numbness and shaking, and shall pay the medical care cost, etc. The components of relief are almost the same as those of the basic agreement which was reached with groups of the plaintiffs.

This policy clearly states that the enterprises concerned, the national government and the Kumamoto Prefectural Government shall express their apologies to all Minamata Disease victims in the area near Minamata Bay and in the Agano River basin at the earliest appropriate opportunity and shall also promote the development of local communities and research on as well as international cooperation for Minamata Disease.

On May 1, 2010, then Prime Minister Hatoyama attended and gave prayers at the Memorial Service for the Victims of Minamata Disease and was the first prime minister to do so (see Appendix 2). On the same day, the acceptance of applications for relief started, and eligible persons began to receive a lump sum payment in October 2010. As of the end of October 2010, 19,494 people have applied for relief while 16,823 people have applied to switch their health care passbook to a Minamata Disease victim passbook. Because of this, the number of new applicants for certified Minamata Disease patient status under the Compensation Act has been declining. The national government is determined to actively publicise the relief measures in the coming years so that all potential victims will be fully aware of these measures and no-one will find it difficult to apply. Every effort will be made to provide relief for every single person entitled to relief as the Special Relief Act requires finalisation of the subject persons for relief in approximately three years from the beginning of relief.

Efforts to Address Environmental Pollution

The following section describes several efforts to address the polluted environment, including the pollution of fish and shellfish.

Dredging of Contaminated Bottom Sediment

The Chisso Minamata plant ceased the production of acetaldehyde in May 1968. In the case of the Kanose plant of Showa Denko, the acetaldehyde manufacturing process was closed down in January 1965 prior to the official acknowledgement of Niigata Minamata Disease in May 1965.

Such closure of the manufacturing process means that the chance of exposure to methylmercury at a level of possibly acquiring Minamata Disease was presumably non-existence in 1969 in the area around Minamata Bay and in 1966 in the Agano River Basin at the latest.

Landfill in Minamata Bay
Photograph: Minamata Disease Municipal Museum

Even though the discharge of the methylmercury compound was stopped, removal of the bottom sediment in water nearby the discharge point was necessary because of the deposition of mercury in such sediment.

From 1977 to 1990, the Kumamoto Prefectural Government dredged some 1.5 million m^3 of bottom sediment showing a mercury concentration above the provisional reference value for removal (25 ppm) and reclaimed 58 ha of land using this sediment (sealed filling). This operation was based on the Act Concerning Payment of the Cost of Pollution Prevention Work by Polluters (Act No. 133 of 1970) and the cost was paid by Chisso, the national government and the Kumamoto Prefectural Government. The actual contributed amount was some ¥30 billion by Chisso and some ¥9 billion each by the two governments involved. Dredging was also conducted at the Marushima Fishing Port and the Marushima-Hyakken Canal.

In Niigata Prefecture, in 1976, Showa Denko paid the costs of dredging mercury-containing sediments from locations near the factory wastewater drain outlet where the concentration of mercury exceeded the provisional reference value for removal.

Fishing-Related Measures

(1) Installation of Dividing Nets

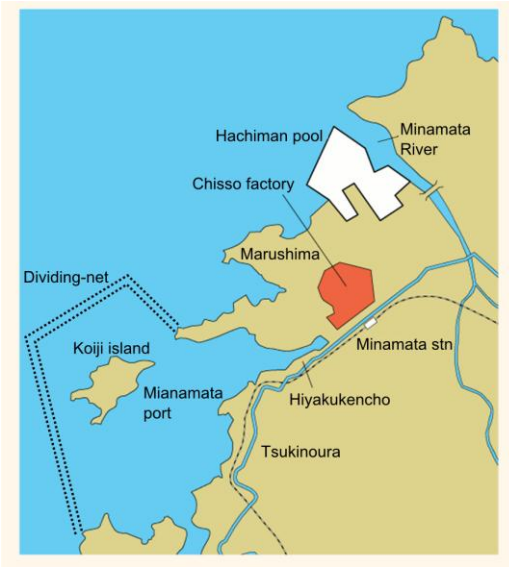
In 1974, the Kumamoto Prefectural Government installed dividing nets to contain polluted fish inside

Minamata Bay (Fig. 6). The dividing nets were removed in 1997 on the grounds that the mercury levels for seven species of fish were below the provisional control values (the average total mercury and average methylmercury levels for fish are 0.4 ppm and 0.3 ppm respectively) for three consecutive years.

(2) Restrictions on Fishing

In the area around Minamata Bay, reasonable suspicion began to occur around 1956 that the eating of local fish and shellfish was the cause of Minamata Disease. Based on this, the Kumamoto Prefectural Government issued guidance to voluntarily restrain from eating fish and shellfish caught in Minamata Bay and also advised the Minamata City Fishermen's Cooperative to voluntarily refrain from fishing inside Minamata Bay. This voluntary restraint from fishing, i.e. self-imposed restraint, prohibition of fishing based on the fisheries compensation agreement and compulsory purchase of locally caught fish and shellfish intermittently continued until October 1997 when the dividing nets in Minamata Bay was completely removed. During this period, Chisso and others paid fisheries compensation from time to time.

Fig. 6 Installation of Dividing Nets
(As of October 1, 1977)



Source: Ministry of the Environment

In regard to Agano River, the Niigata Prefectural Government regulated the fishing activities of the relevant fishermen's cooperatives and provided guidance for local people to refrain from eating locally caught fish and shellfish. Meanwhile, Showa Denko paid fisheries compensation.

Changing State of Pollution Situation

In Minamata Bay and the Agano River, water quality, sediments, and fish have been monitored continuously on a regular basis.

Recovered Minamata Bay (2008)
Photograph: Makoto Morishita

A mercury survey conducted by the Kumamoto Prefectural Government in FY 2009 found that the sea environment was favourable, as was the case in the previous year. To be more precise, the water quality met the environmental standard values (total mercury of 0.0005mg/l or less and zero detection of alkylmercuric compound); the bottom sediment cleared the provisional reference value for removal, and fish also cleared the provisional control value. A similar survey conducted by the Niigata Prefectural Govenrment found that the water quality standard was achieved along with clearance of the provisional reference value for sediment removal and of the provisional control value for fish, indicating a favourable river environment as was the case in the previous year.

It is important to continue regular monitoring of water quality, sediments, and fish in these locations. With regard to Minamata Bay, it is also important to conduct appropriate safety control measures, such as inspection of reclaimed land.

Revitalisation of Local Communities and Handing Down of Valuable Lessons

The Minamata area today has restored its past scenic beauty as the polluted area has been safely reclaimed with the verification of the safety of local fish and shellfish. Concerted efforts for community development have been made to turn the major negative legacy of Minamata Disease into a positive legacy.

This section describes some of the initiatives currently in progress in the area. One initiative aims at improving the level of local health care and welfare so that aging victims, their families and local residents can spend their lives with peace of mind. Another initiative aims at revitalising the local community while overcoming the state of exhaustion caused by the discrimination against victims and conflict among local residents as a result of the mixed existence of the offender and victims in a small company town.

Political Settlement in 1995

From 1990 to 1998, the Kumamoto Prefectural Government and the Minamata Municipal Government jointly promoted the Minamata Initiative for Environmental Creation based on the concept of "*Moyai-naoshi*" (literally meaning "mooring the ship again") to restore local community bonds for revitalisation. One positive outcome of this initiative is the memorial service for Minamata Disease victims which has been held on 1st of May every year since 1992. Meanwhile, various organizations related to Minamata Disease have independently organized events, such as the display of photographs and information panels and guided environmental study tours.

Based on these initiatives and activities, the political settlement in 1995 led to the implementation of the following work designed to revitalise and promote local communities.

1. *Moyai-Naoshi* Centres which function as a base for interchanges and local welfare services and for work to repair the bonds among local residents were established in three places jointly by the national government, the Kumamoto Prefectural Government, the Minamata Municipal Government and Ashikita Municipal Government.
2. A programme to dispatch story tellers to developing countries was implemented from 1996 to 2002 to convey the experiences of and lessons learned from Minamata Disease. Since 2003, another programme has been in progress to disseminate knowledge of Minamata Disease to teachers and students in Japan and also to invite government officials from developing countries for training in Japan.
3. The National Institute for Minamata Disease which was established in Minamata City in October 1978 was reorganised in 1996 with the addition of the new Department of International Affairs and Environmental Science. The activities of the centre include social science and natural science investigations and research and the gathering, arrangement and supply of reference materials and data on Minamata Disease. Moreover, the international research system of the centre has been strengthened with such wide-ranging activities as the dispatch of researchers to countries where the problem of mercury pollution has manifested, joint research with foreign researchers and the hosting of international symposia.

"On Future Minamata Disease Countermeasures" of April 2005 and Cabinet Decision of April 2010

The cabinet approval of the political settlement and statement by the Prime Minister in 1995 have been followed by a statement entitled "On Future Minamata Disease Countermeasures" issued by the MOE in 2005 and a cabinet decision in 2010 calling for the revitalisation and development of local communities, transmission of Japan's experiences of Minamata Disease and international cooperation in addition to the settlement of disputes. The Council for Minamata Disease established in May 2005 has thoroughly examined the problem of Minamata Disease and put forward recommendations for future tasks based on

the lessons learned. In September 2006, the Office for Environmental Welfare Promotion in Minamata Disease Areas was established at the MOE and commenced the following works in collaboration with the local governments and various organizations concerned to promote medical treatment and welfare as well as *Moyai-naoshi* in the subject areas while listening to and accommodating local needs.

(1) Consolidation of Medical Treatment and Welfare Measures

The following initiatives and works are ongoing to ensure that aging Minamata Disease victims, their families and local people can live in the community with peace of mind.

1. Initiative to support the social activities of patients with fetal-type Minamata Disease, including improvement of the operation of the Hotto (meaning "feel relieved" in Japanese) House, a small-scale multi-functional care facility run by Sakaeno-Mori (a social welfare juridical person), home visits, meaningful life creation and social support services by the Minamata Disease Cooperation Centre (a NPO) and the development of facilities for fetal patients and others to spend time with their families at the Meisuien, a care facility set up by the Minamata Municipal Government to accommodate certified Minamata Disease patients.
2. Model projects involving rehabilitation, etc. to alleviate neurological symptoms and improve or prevent any further deterioration of motor impairment caused by exposure to methylmercury in remote areas/islands, such as Goshoura, Amakusa City and Tsunagi Town in Kumamoto Prefecture and Shishijima Island, Nagashima Town in Kagoshima Prefecture
3. Initiative to promote welfare measures for Minamata Disease victims, including the establishment of the Minamata Disease Consultation Desks in the three prefectures concerned (Kumamoto, Kagoshima and Niigata), development of a network of administrative bodies and support facilities for victims in Kumamoto Prefecture, the *Moyai* Musical Festival in Minamata City, study course on Minamata Disease on board a *utase* boat (sailing trawler) in Ashikita Town and compilation of a care book for victims and sponsorship of seminars by the Niigata Prefectural Government and the Niigata Municipal Government
4. Initiative by the Minamata Municipal Government to support the daily life of the elderly, including certified patients, in the area of Minamata Disease
5. Initiative by the Amakusa and Minamata Municipal Governments in Kumamoto Prefecture to establish bases for the promotion of the activities of local residents to support Minamata Disease victims and also interchanges between local residents and the said victims, etc.
6. Initiative by the National Institute for Minamata Disease, including the provision of rehabilitation opportunities for Minamata Disease victims, the implementation of a model project to prevent and alleviate neurological symptoms in the municipalities concerned, and the research contributing to identifying mechanism to cause Minamata Disease by using a magnetoencephalogramme

(2) Promotion of the Revitalisation and Reconciliation (Moyai-naoshi) of Local Communities

In 2006 which was the milestone of the 50th anniversary of the official acknowledgement of Minamata Disease, the national government, local governments, organizations relating to Minamata Disease and local residents joined together to organize an executive committee and conducted further examination of the problem of Minamata Disease, a memorial service for victims of Minamata Disease, a symposium to pass on the lessons learned, a photo-panel exhibition on Minamata Disease and the production of a booklet commemorating the 50th anniversary.

Since 2006, the *Moyai-naoshi* initiative has been practiced through the following works.

1. Events, etc. to commemorate the victims of Minamata Disease, including the memorial service and Fire Festival in Minamata City
2. Interchange programme of the Niigata Prefectural Government for children in the Niigata and Minamata areas and Minamata Disease victims
3. Initiatives to promote learning about the environment, including the development and implementation of programmes to learn about the environment by the prefectural as well as municipal authorities and local groups in Kumamoto and Niigata, short seminars organized by the Minamata College of the Environment and other lecture courses designed to pass on knowledge of Minamata Disease and to develop human resources to be involved in environmental protection work, and improvement of the facilities at the Minamata Disease Municipal Museum
4. Initiative to enable children in the Minamata Disease areas, who will be the main players in the coming years, to study the reality of the disease and environmental conservation activities based on past experience and to pass on stories about this man-made disaster to the people in Japan and abroad
5. Initiative to transform the entire Minamata Disease areas in Kumamoto and Niigata Prefectures into field museums on the environment for the application of pioneering environmental work, etc. with a view to disseminating the results of such work throughout Japan and abroad

Minamata Disease Memorial Monument

Photograph: Ministry of the Environment
The memorial monument has the epitaph "All deceased victims slumbering in Shiranui Sea. We will never repeat this tragedy again. Requiescant in pace."

Interchange programme between Niigata and Minamata (at Hyakken wastewater channel)

Photograph: Niigata Prefectural Government

[Column 2] Work by External Committees

(1) Social Science Research Group on Minamata Disease

The Social Science Reserach Group on Minamata Disease (hereinafter referred to as the "Research Group") was established as a research project of the National Institute for Minamata Disease (NIMD) in July 1997 based on the purport of the "Statement of the Prime Minister on the Settlement of the Minamata Disease Problem", a cabinet decision as part of the political settlement in 1995. The Research Group examined the tragic history of Minamata Disease, especially the circumstances of the wide spread of its damage in the period from the time of its official acknowledgement in May 1956 to the issue of the consensus opinion of the national government in September 1968, focusing on the responses of such stakeholders as administrative bodies, private enterprises, research institutions and victims from the viewpoint of social science. The principal aim was to learn valuable lessons which could assist policy decisions of the governments of Japan and foreign countries and the formulation of environmental pollution control measures by private enterprises. The Research Group met 11 times and intensive discussions took place.

The subsequent report not only describes the factual history of the events resulting in the spread of damage in the above-mentioned period but also examines the circumstances and lessons learned in regard to 20 issues as well as general lessons from the incident of Minamata Disease. Some of these 20 issues are (1) prevention and early discovery mechanisms of health damage, (2) initial response when an unexplainable disease takes place, (3) involvement of researchers, enterprises and national and local governments in the investigation of the cause of the disease, (4) measures to be taken by a causative enterprise and national and local governments and (5) roles and responses of politicians, the administration, scientists, mass media, patients and local people.

(2) Council for Minamata Disease

The Council for Minamata Disease was established as a private consultation group of the Minister of the Environment in May 2005, one year before the 50th anniversary of the official acknowledgement of Minamata Disease. The Council met 13 times to examine the social and historical significance of the Minamata Disease problem and to make recommendations for future tasks for the administration and other stakeholders based on the lessons learned from the disease.

The principal recommendations submitted in September 2006 are (1) development of new "administrative ethics", making it an obligation for administrative officials to prioritise the viewpoint of protecting people's lives and to deal with the relevant matters in a strenuous manner from the viewpoint of "enriching two and a half persons" instead of "a dry third person", (2) urgent introduction of a new permanent framework for relief and compensation for newly applying persons for certified status as well as potential victims, (3) designation of the Minamata area as a "model pioneering area for welfare" (tentative name) for the active promotion of measures designed to ensure a peaceful and stable life for Minamata Disease victims, especially fetal patients, when they become old, (4) active support for the "*Moyai-naoshi*" activities of people in the Minamata area and (5) designation of the Minamata area as a "model environment city" (tentative name) and active support for a revitalisation plan featuring the local environment, socioeconomy and culture.

[Column 3] Story Teller Programme

In January 1993, the Minamata Disease Municipal Museum was opened to pass on the experiences and lessons of Minamata Disease to subsequent generations for the purpose of never repeating this disasterous pollution. This was followed by the opening of the Niigata Learning Centre for Humans and the Environment: Niigata Prefecture Minamata Disease Museum in August 2001. By October 2010, some 700,000 people have visited the former while some 350,000 people have visited the latter. Both museums have introduced a story teller programme whereby visitors can directly listen to a Minamata Disease patient about his/her experience so that the experiences and lessons of Minamata Disease can be passed on to subsequent generations.

Message from Mr. Hamamoto, President of the Society of Story Tellers at the Minamata Disease Municipal Museum

"I tell this story so that such disasterous pollution as that which caused Minamata Disease will never happen again. While we enjoy an affluent life, we are polluting nature and harming our own health. If we want to continue our convenient and affluent lives in the coming years, we must seek a lifestyle which does not pollute nature and which is grateful to nature. I hope that listeners will feel the awfulness of pollution and understand those things which we human beings should not do so that they can create a 21st Century in which people live with peace of mind."

Story teller programme
Photograph: Minamata Disease Municipal Museum

Ms. Kotake, a Story Teller at the Niigata Learning Center for Humans and the Environment

"I strong believe that we must all treasure water which is essential for our survival and our familiar nature so that the next generations will not have to undergo our experience. The more convenient society becomes, the more it is liable to pollution. I hope that as many people as possible, especially today's young people, will learn about our experience and understand the importance of protecting nature and our environment in the coming years."

[Column 4] Environmental Initiatives of the Minamata City

In order to prevent a repeat occurrence of Minamata Disease, unprecedented disaster caused by pollution, the Minamata Municipal Government issued the Declaration for the Creation of a Model Environment City in 1992 and has been implementing various environmental initiatives, making the best use of its experiences and lessons learned to transform the negative legacy of environmental pollution into a positive asset.

Community development efforts with due consideration of the environment include (i) the promotion of re-use, recycle and waste reduction through a thorough sorted household waste collection scheme where citizens have been required to sort their own waste into 20 different categories (currently 23 categories) since 1994, (ii) creation and implementation of the municipality's own ISO systems (for households, schools and others) and (iii) facilitation of an eco-town project and a project to promote coexistence with the environment in Minamata.

In 2008, the national government selected 13 cities nationwide as "eco-model cities", and Minamata City was one such city. Following this positive assessment and certification of the municipal efforts to achieve a low carbon society, the 5th Master Plan formulated by the Minamata Municipal Government in 2009 adopted the future image of a vibrant model environment city of warmth and energy. This plan aims at promoting local development utilising local resources and creating a city of sustained economic development in the "spirit of *Moyai*" advocating joint "thinking and actions" on the part of citizens and the administration beyond their own narrow interests.

Separate waste collection by local citizens
Photograph: the City of Minamata

The concrete development targets are the building of zero waste communities, realisation of a low carbon society through the active utilisation of new renewable energies, promotion of the development and marketing of safe, locally produced agricultural, forestry and fisheries products for local consumption, consolidation of environmental education to foster benevolent human resources, increased awareness of the need for collaboration with citizens and enhancement of "thinking and actions".

With these initiatives, Minamata City has won the Environmental Capital Contest organized by the National Network for Environmental Capital Contest (11 member organizations, including the NPO Citizens' Environmental Foundation) four times in the last 10 years, enjoying the reputation of the nearest local government to the title of "Environmental Capital". This contest aims at promoting pioneering efforts to create sustainable local communities in Japan.

In 2010, the Minamata Municipal Government established the Study Group for Environment-Friendly Minamata City to further advance its efforts to develop itself as a model environment city for the revitalisation of local communities and other purposes.

Towards Further Initiatives

Historically, the national government has implemented a number of initiatives/schemes/programmes in a trial and error fashion for the relief of people suffering from health problems, revitalisation of local communities and provision of information in collaboration with local governments and other organizations concerned. Despite these efforts, many problems remain unsolved as vividly illustrated by the application by many people for certified status under the Compensation Act and the filing of lawsuits for compensation for damage even after the 50th anniversary of the official acknowledgement.

Under these circumstances, both the House of Representatives and House of Councillors passed the "Resolution to Solemnly Undertake Not to Repeat Miserable Pollution of Minamata Disease upon the 50th Anniversary of the Official Acknowledgement of Minamata Disease" in the 164th Diet Session in 2006, the year of the 50th anniversary. Meanwhile, the Prime Minister delivered a "Statement on the 50th Year Since the Official Acknowledgement of Minamata Disease". The principal contents of this statement are (1) sympathy for the suffering of the victims for a long period of time, (2) apology for the failure to prevent the spread of damage by Minamata Disease and (3) determination of the national government to achieve a society which protects the environment and provides a peaceful life based on the painful lessons learned while continually and extensively passing on the experiences of the disease at home and abroad.

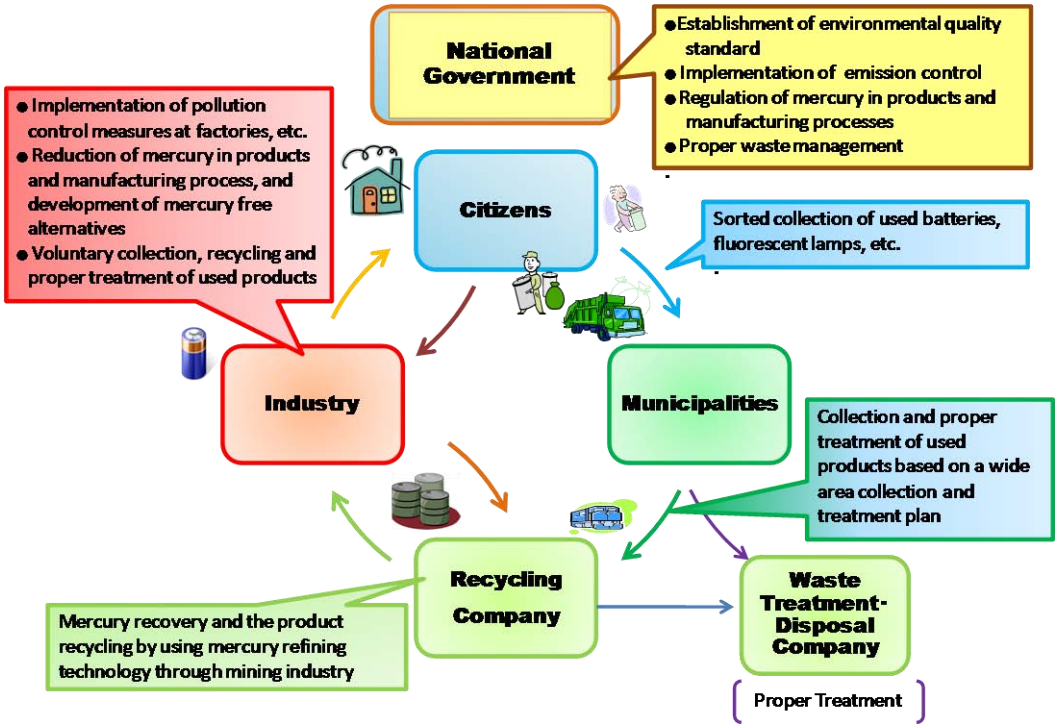
In July 2009, the Act on Special Measures Concerning Relief for Victims of Minamata Disease and Solution to the Problem of Minamata Disease was enacted, followed by the cabinet decision on the Implementation Policy for Relief Measures in April 2010. In his prayers during his attendance at the memorial service on May 1, 2010 as the first Prime Minister to attend this ceremony, Prime Minister Hatoyama expressed (1) his condolences to those people who had lost their precious lives, (2) acceptance of liability and apology for failure to perform the duty of preventing pollution and spread of the damage of Minamata Disease, (3) opening of the facility to accept new applications on the very day in accordance with the Implementation Policy for Relief Measures for the swift relief of victims as much as possible and (4) intention to facilitate (i) medical treatment and welfare for fetal patients and others and (ii) restoration of the traditional bonds of local communities and the *Moyai-naoshi* initiative to create a model for the development and growth of local communities by the promotion of environmental activities, to pass on the lessons learned from Minamata Disease to the rest of the world and to wholeheartedly try to realise a caring, pollution-free and sustainable society (see Appendix 2). With such comments by the government, lawsuits are now becoming amicable settlements, suggesting that the path to total settlement is finally emerging.

Today's measures to deal with the various problems associated with Minamata Disease have been developed through the history of the disease and many initiatives and measures introduced over a period of more than 50 years. The promotion of these measures is essential while searching for what is really required and effective from the viewpoint of environmental protection and *Moyai-naoshi* of local communities. Equally crucial are efforts combining medical treatment corresponding to the aging of the victims and others with welfare in the community to reassure everyone, including Minamata Disease victims, of a pleasant and peaceful life based on the Resolution of the Diet, Statement of the Prime Minister and Act on Special Measures described above. It is the intention of the government to continually disseminate Japan's experiences and lessons learned from Minamata Disease at home and abroad. The government also considers it to be very important to inform people in Japan and the rest of the world and to let them actually see present-day Minamata City which has transformed itself into a leading environment-friendly city.

Part 2　Mercury Management in Japan

Having experienced massive damage due to Minamata Disease, the governments, industries and citizens in Japan have been collectively engaged in mercury management and performing their own specific roles. The roles of these stakeholders in Japan's mercury management are explained in Part 2 (See Fig. 7).

Fig. 7　Overview of Mercury Management in Japan



Government Measures

Prevention of Environmental Pollution

In Japan, wide-ranging measures based on the environment-related laws/regulations are implemented to protect human health and to conserve living environment by preventing environmental pollution caused by mercury.

Regarding water quality, there are national environmental quality standards for mercury to be maintained or achieved for public water areas and groundwater. Factories and business establishments are subject to effluent regulations and ground permeation regulations to ensure that these standards are met. In the case of effluent standards, local governments can stipulate their own stricter standards if necessary in addition to the national unified standards. Soil is also subject to the relevant environmental quality standards and investigations as the Soil Pollution Countermeasures Act stipulates the standards for the quantities of pollutants contained in soil or eluted from soil.

In regard to air, guideline values equivalent to environmental quality standards are specified to reduce the health risk posed by mercury and voluntary mercury emission control by business operators is in progress.

In the case of certain business operators handling mercury and its compounds, these operators have the obligation to notify the amount of release to the environment and the amount transferred in waste to the competent authority pursuant to the statutory PRTR (Pollutant Release and Transfer Register) system.

Table 1　National Environmental Standard and Emission Standard for Mercury

	Overview of Standard	Relevant Law/regulation
Air	Guideline value of hazardous air pollutant in ambient air for the purpose of reduction of human health risk: Mercury (mercury vapor) is not exceeding 40 ng Hg /m3 (annual average value)	As part of measures for hazardous air pollutant under the Air Pollution Control Law
Public water	Environmental quality standard: Total mercury is not exceeding 0.0005 mg/L, and alkyl mercury is not detected (annual average value)	The Basic Environment Law
	Effluent standard: Mercury, alkyl mercury and other mercury compound are not exceeding 0.005 mg/L, and alkyl mercury compound is not detected	Water Pollution Control Law (Regulation of discharge of effluent)
Ground water	Environmental quality standard: Total mercury is not exceeding 0.0005 mg/L, and alkyl mercury is not detected (annual average value)	The Basic Environment Law
	Requirement on permeation of specified percolated water : Not detected	Water Pollution Control Law (Regulation on permeation of specified percolated water)
	Ground water clean up standard: Mercury, alkyl mercury and other mercury compound are not exceeding 0.0005 mg/L, and alkyl mercury compound is not detected	Water Pollution Control Law (Order to take measures related to clean up of ground water)
Soil	Environmental quality standard: Total mercury is not exceeding 0.0005 mg in1 litter sample solution	The Basic Environment Law
	Elution standard: Mercury and its compound are not exceeding 0.0005 mg/L and no detection of alkyl mercury Content standard: Mercury and its compound are not exceeding 15 mg/kg	Soil Contamination Countermeasures Act (Standard for designation of the area which requires measures (standard on contamination status))

Control of the Use of Mercury in Production Processes and Products

There are several production processes using mercury. Typical processes are those to produce caustic soda, chlorine and vinyl chloride monomer. In Japan, however, all of these processes have now been replaced by alternative processes which do not use mercury.

Cosmetics, agrochemicals and other products, the risk of which to human health is high because of the use of mercury, are subject to individual regulations which either totally prohibit the use of mercury or stipulate the upper limit of the mercury content (see Table 2).

Table 2　Regulation of Mercury Use in Product

Category	Overview of regulations
Cosmetics	Ban of the use of mercury and its compound （Cosmetics standard under the Pharmaceutical Affairs Act）
Agricultural chemicals	Ban of the sales and use of agricultural chemicals falling under the category of pharmaceutical product in which active ingredient is mercury and its compound and used for control of agricultural pest （Ministerial Ordinance of Ministry of Agriculture, Forestry and Fisheries based on the Law on Fertilizer Control）
Sludge fertilizer	Maximum allowable content of hazardous substances in sludge fertilizer (sewage, human waste, and industrial sludge, etc.) - Mercury or its compound: not exceeding 0.005mg/L in sample solution - Alkyl mercury: not detected in sample solution （Official specification of fertilizer under the Law on Fertilizer Control）

Category	Overview of regulations
Product recycled from sludge	Required standard on product recycled from sludge - Total mercury: not exceeding 0.0005mg/L in sample solution - Alkyl mercury: not detected in sample solution (Documents and Drawings attached to Application Form for Approval of Sludge Recycling and Criteria on Recycling)
Household commodity	No detection of organic mercury compounds from the following household commodities - General household commodity: adhesive, paints, wax, shoe ink, shoe cream - Fiber product: diaper and its cover, bib, underwear (shirts, pants, drawers, etc.), gloves, socks, sanitary band, sanitary pants (Law on Control of Household Commodities containing Hazardous Substances)
Pharmaceutical products	Oral preparation Use of mercury compound is not allowed. External preparation The use of mercury compound, other than mercurochrome, as active ingredient is not allowable. The use of mercury compound as preserving agent is allowed only if there are no alternatives from viewpoint of pharmaceutical preparations and safety measure. (Approval of Pharmaceutical Product under the Pharmaceutical Affairs Act)

The Act Concerning Promotion of the Procurement of Eco-Friendly Goods and Services by the State and Other Entities (hereinafter referred to as the "Green Procurement Act") aims at promoting the procurement of goods and services to contribute to reducing the environmental load in the public sector. The criteria for the procurement items specified by the Basic Policy Concerning the Procurement of Eco-Friendly Goods and Services, in turn based on the said Act, include criteria relating to mercury, thereby facilitating the development and wide use of mercury-free products and reducing the mercury content of products (see Table 3).

Table 3 Basic Policy Concerning Promotion of the Procurement of Eco-Friendly Goods and Services (Excerpt)

Type of Product	Limit Value of Mercury in the Product, etc
Toner cartridge	The photoreceptor shall not contain mercury as a prescription constituent.
Electronic computer, Display	The mercury content shall not exceed the standard content value stipulated by the Japanese Industrial Standards (JIS).
Fluorescent lamp (40 W straight tube-type)	The average amount of included mercury shall be 10 mg or less per product.
Bulb-type fluorescent lamp	The average amount of included mercury shall be 5 mg or less per product.

In addition, the national government has actively implemented measures designed to facilitate the shift of the caustic soda and chlorine production processes to those which do not use mercury and to reduce the amount of mercury in batteries.

Environmentally Sound Management of Waste

Mercury is present in the dust, sludge and other waste generated by facilities combusting fossil fuel, metal refineries and waste incineration plants. To ensure the appropriate disposal of such waste, waste with a mercury concentration above a specified level is classified as industrial waste requiring special management (Table 4) and is subject to the disposal standards. In short, the transportation and disposal of such waste must meet stricter regulations than ordinary waste. In regard to the final disposal of industrial waste requiring special management, disposal at ordinary controlled type landfill sites is possible as long as waste containing mercury is treated to show the mercury concentration equal to or below the acceptance criteria shown in Table 4. When waste is still judged to be industrial waste requiring special management after treatment, it is a compulsory requirement for such waste to be landfilled at strictly controlled landfill

sites where the landfill area is completely shut off from public water areas and groundwater by a concrete base and partition walls.

Table 4　Acceptance Criteria for Industrial Waste Requiring Special Management

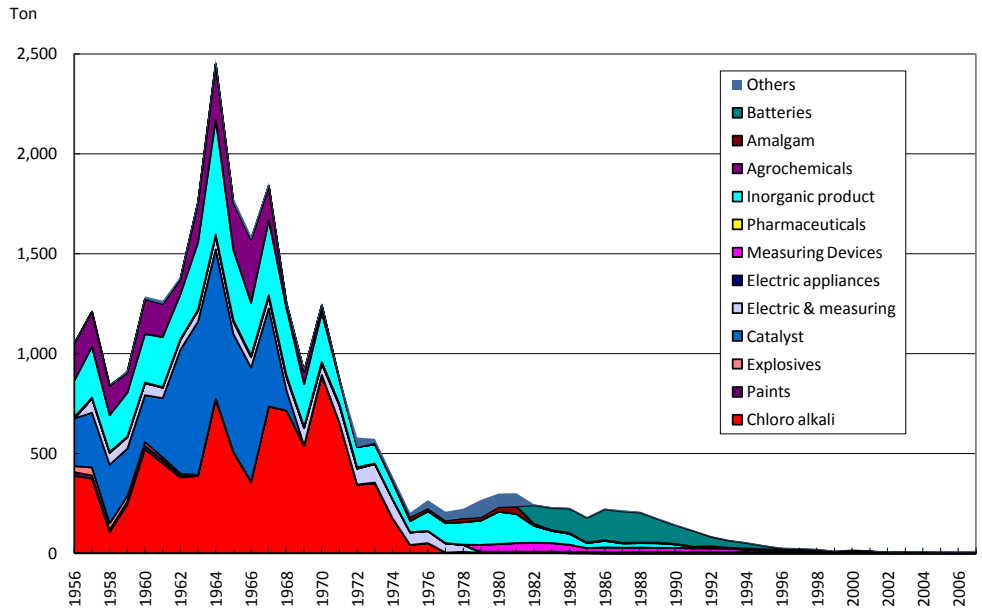
Waste Characteristics	Concentration of Mercury
Untreated and treated ash, dust, mining sludge and sludge (excluding waste acid and waste alkali)	• Alkyl mercury: not detected • Mercury: 0.005 mg/L (in the elution test)
Waste acid, waste alkali, treated waste acid or waste alkali (waste acid or waste alkali), treated ash, dust, mining sludge and sludge (waste acid or waste alkali)	Mercury: 0.05 mg/L (concentration in waste acid or waste alkali)

Mercury Demand Reduction in Production Processes and Products by Industries

Figure 8 shows that domestic demand for mercury reached a peak in 1964 in which approximately 2,500 tons of mercury were consumed. After that, owing to the introduction of technologies to reduce the mercury use and shift to mercury free alternatives, its demand has declined drastically. In recent years, mercury demand in Japan is approximately 10 tons per year.

This section describes the efforts in Japan to reduce the mercury demand for production processes and products.

Fig. 8　Trend of Mercury Demand in Japan



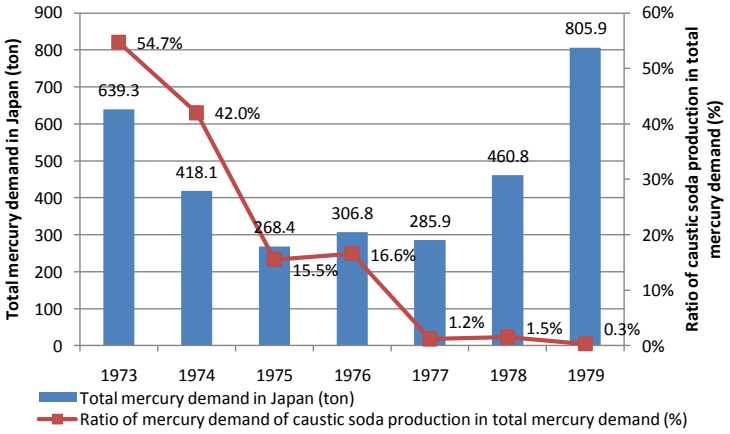
(Note) Fluorescent lamp was classified as electric & measuring between 1956 and 1978 and as electric appliances since 1979.
Source: Yearbook of Mining, Non-ferrous Metals, and Products Statistics

Mercury Demand Reduction in Caustic Soda Production

Caustic soda (sodium hydroxide: NaOH) is a typical strong alkaline substance. It is widely used as a basic material for the dissolving and refinement of metal, removal of impurities, bleaching, neutralisation and softening. Its further use for the production of chemical fibres, dissolving and bleaching of pulp and as a raw material for soap and detergent signifies its status as an essential substance for our daily life.

Caustic soda can be produced along with chlorine and hydrogen through the electrolysis of brine. There are several processes: ion-exchange membrane process, diaphragm process and mercury process. During the post-war economic growth period in Japan, caustic soda was primarily produced by the mercury process. The level of technology in Japan regarding the mercury process at that time was one of the highest in the world, and the production of caustic soda using this process accounted for more than half of the mercury consumption in Japan up to the mid-1970s (see Fig. 9).

Fig. 9 Trend of Total Mercury Demand and Mercury Demand for Caustic Soda Production



Source: Toshiyuki Sugino. "The Pioneer Days of Electrolytic Chlorine Industry in Japan", CHMICAL INDUSTRY, 1993.

There used to be the assumption that there was no possibility of the occurrence of Minamata Disease in the area around a caustic soda plant which only discharged inorganic mercury. Following a report of the third occurrence of Minamata Disease caused by the discharge of mercury used for caustic soda production to the Ariake Sea in 1973 (actually this report was later denied), some 1,200 fishing boats surrounded a caustic soda plant in the Seto Inland Sea in June of the same year, causing the temporary shut down of the plant.[1] In response to such public anxiety, the national government decided to strictly enforce the use of a closed system at caustic soda plants using the mercury process and to promote a conversion to the diaphragm process.[2] As a result of efforts by the Japan Soda Industry Association to promote this conversion, the consumption of mercury per one ton of caustic soda produced fell from 113.9 g in 1973 to 2.3 g in 1979 (see Fig. 10). By 1986, the mercury process was completely withdrawn for the production of caustic soda in Japan.[3]

During this conversion stage, the then MITI introduced a scheme for equal volume exchange between caustic soda produced by the mercury process and caustic soda produced by the diaphragm process and a system for price difference settlement in view of the higher production cost of the diaphragm process. Under this system, the MITI paid out ¥3.87 billion for 975,000 tons of caustic soda, facilitating the conversion to the diaphragm process.[4] Because of the inferiority of the diaphragm process to the mercury process in terms of energy consumption and product quality and because of the difficulty of completely

[1] Tetsuya Kameyama. "Science Technology and Environmental Issues – Minamata Disease and Conversion of Caustic Soda Production Technology", SCIENCENET, Vol. 32, May 2008.

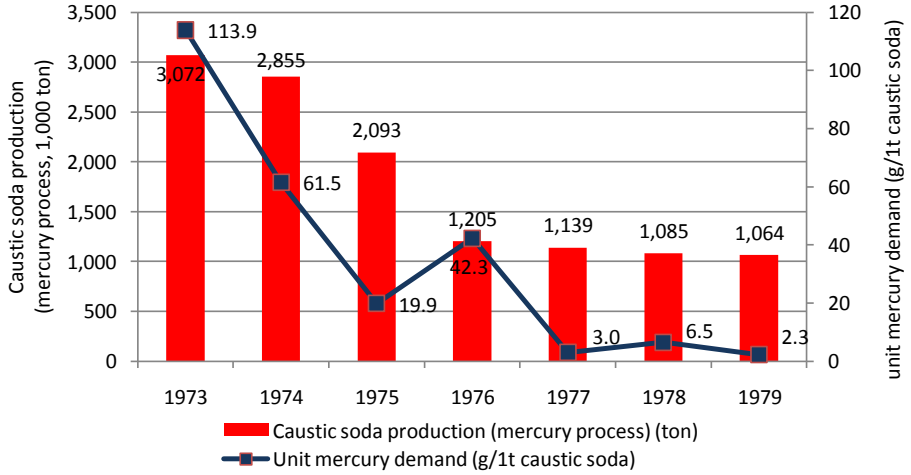
[2] In June, 1973, the First Conference to Promote Mercury Pollution Countermeasures was held with the participation of 13 ministries and agencies concerned and decided on the strict enforcement of the closed system for caustic soda plants using the mercury method and the conversion to the diaphragm method by the end of September 1975 as much as possible. The Third Conference held in November of the same year adopted some modifications in that one-third of the plants using the mercury method would convert to the diaphragm method by the end of September 1975 with the conversion of the remaining plants by the end of March 1978.

[3] Website of Japan Soda Industry Association (http://www.jsia.gr.jp/english/index.html)

[4] It was estimated that those companies which converted to the diaphragm method incurred a total deficit of ¥23.9 billion while those still using the mercury method produced a total profit of ¥2.2 billion.

converting to the diaphragm process from the viewpoint of maintaining the international competitiveness of the industry, the industry made a conscious decision to proceed with the technical development of the ion-exchange membrane process which was still a pioneering process at the time (see Column 5 for further details).

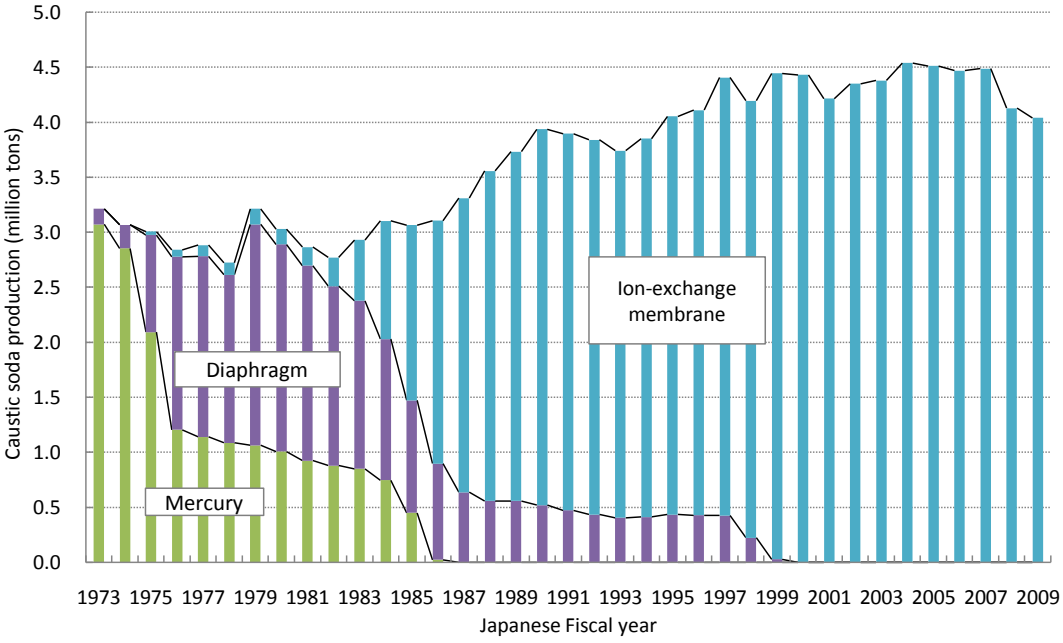
Fig. 10 Trend of Caustic Soda Production and Unit Mercury Demand in Mercury Process



Source: Toshiyuki Sugino. "The Pioneer Days of Electrolytic Chlorine Industry in Japan", CHMICAL INDUSTRY, 1993.

As a result of investment in excess of ¥300 billion in technical development by the caustic soda industry in Japan, the technology for the ion-exchange membrane process grew to become an excellent technology representing Japan. Commercial production using this technology commenced in 1979, and the ion-exchange membrane process has been used for the entire production of caustic soda in Japan since 1999 (see Fig. 11). Boasting many advantages, including high product quality and low energy consumption, this technology is being exported to many countries in the world today.

Fig. 11 Trend of Caustic Soda Production by Process



Source: Japan Soda Industry Association

[Column 5] Technology Development of Ion-exchange Membrane Process for Caustic Soda Production

The conversion from the mercury process, which began in 1976, encountered the problem of inferior quality caustic soda produced by the diaphragm process in addition to the problem of the higher production cost of the latter.

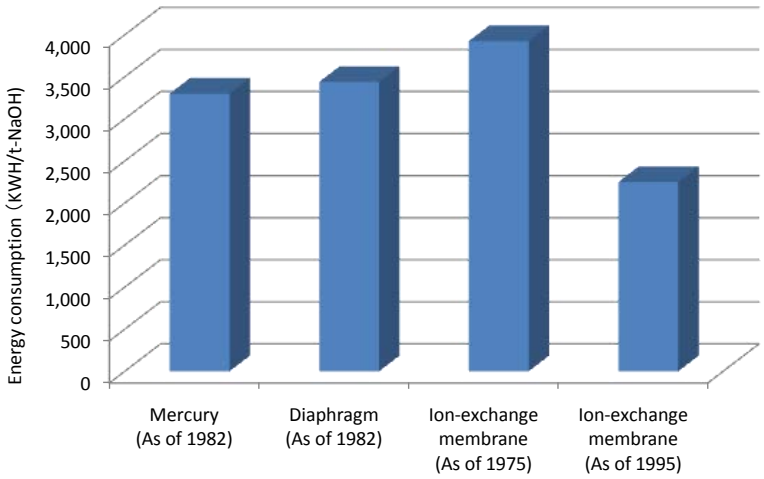
Comparison between Diaphragm and Mercury Processes

		Diaphragm	Mercury
Quality of Caustic Soda Product	Concentration by electrolysis process (wt%)	11-12	48-50
	Salt content (ppm)	-10,000	5-10
Energy Consumption (kWh/t-NaOH)	Electricity for electrolysis & general use	2,740	3,300
	Steam	700	0
	Required energy	3,440	3,300

Source: Kimihiko Sato. "Asahi Glass's Technology Development of Ion-exchange Membrane Method" KAGAKUSHI (The Journal of the Japanese Society for the History of Chemistry), Vol. 24, 1997.

This situation led to industry-wide efforts to develop a commercially viable technology for the newly emerged ion-exchange membrane process. In this technical development, the poor electric current efficiency and low caustic soda concentration posed difficult challenges. With intensive R&D on each component of this process, the electric current efficiency has been increased to 96% or even higher. The total energy consumption is more than 30% less compared to the diaphragm or mercury process.

Energy Consumption by Caustic Soda Production Process



Source: Hiroshi Ohama. "The Improvement of Asahi Chemical's IM Process for Twenty Years", SODA & CHLORINE, Vol. 48, 1997.

Mercury Demand Reduction in Vinyl-chloride Monomer (VCM) Production

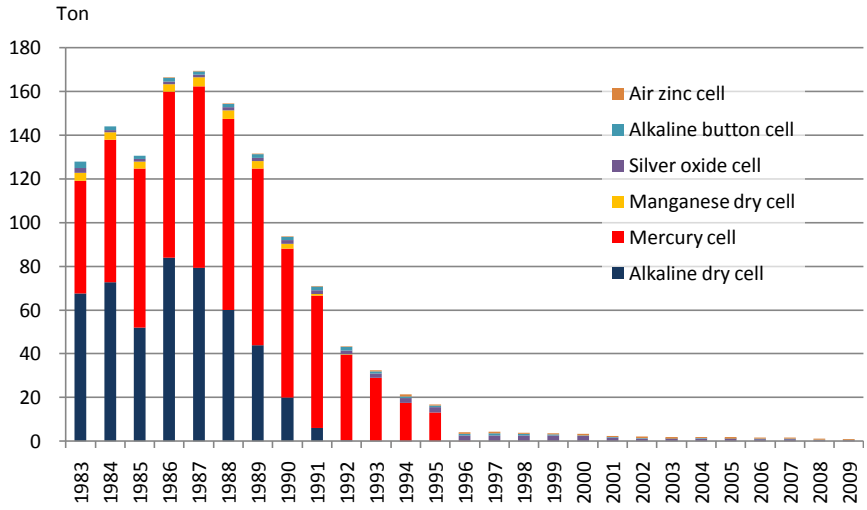
In Japan, the carbide-acetylene process had been used to manufacture VCM in which mercuric chloride ($HgCl_2$) as a catalyst was used to combine acetylene and hydrogen chloride. Due to the rise in cost such as electricity in early 1960s the processes were converted to the ethylene dichloride (EDC) method and the oxychlorination method. Thus no mercury catalyst process is now used to manufacture VCM in Japan.

Mercury Demand Reduction in Batteries

Zinc used for the negative electrodes of dry cells begins to generate gas when it starts to run as a result of a corrosion reaction. This causes not only a decline of the performance of dry cells but also the possible swelling, leakage and/or rupture of dry cells. Mercury used to be added to dry cells to prevent these problems as it restricts the corrosion reaction.

In the early 1980s, mercury pollution caused by discarded dry cells and the necessary recovery of used dry cells became major social issues, partly because of intensive reporting by the mass media on the effects of mercury emitted from waste incinerators on human health. At that time, the then Japan Battery and Appliance Industries Association was already conducting the voluntary collection of used mercury cells. In 1983, the then MHW and MITI jointly issued an instruction to the Association to reduce the total amount of mercury used for dry cells and to further strengthen the ongoing voluntary collection of used mercury cells. In response, the Association began a number of new initiatives, including control of the development of new applications of mercury cells, intensified collection of used mercury cells, research on raw materials of alkaline and manganese cells, research on alternative dry cells using no mercury and research on the effects of landfilled waste alkaline manganese cells on soil. As a result of this research, manganese cells and alkaline cells without mercury were successfully developed in 1991 and 1992 respectively. The production of mercury cells ceased at the end of 1995 (see Fig. 12).

Fig. 12 Trend of Mercury Demand for Domestic Primary Battery Production in Japan



Source: Battery Association of Japan

Such withdrawal of mercury from various types of cells left button cells as the only type of cell still containing mercury[5] and cell manufacturers focused on the development of a technology to produce mercury-free button cells. In 2005, one Japanese cell manufacturer successfully developed a mercury-free silver oxide cell for the first time in the world. Up to the present day, three manufacturers with plants in Japan have developed technologies for the commercially viable production of mercury-free silver oxide cells. In regard to alkaline button cells, a Japanese manufacturer successfully developed a technology for commercially viable production of mercury-free alkaline button cells in October 2009. There is a recycling scheme for used button cells using boxes provided at electrical goods and other stores (refer to the section "Promotion of Recovery, Collection and Management of Mercury Contained in Products.")

[5] There are three types of button cells: (i) silver oxide cells, (ii) air zinc cells and (iii) alkaline cells, and some 800 million button cells are domestically produced a year. Some of the main products using button cells are wrist watches for silver oxide button cells, hearing aid for zinc air button cells and game machines and security buzzers for alkaline button cells.

In recent years, leading industrialised countries have been conducting research on feasible processing methods for the effective recycling of dry cell materials from the viewpoint of the efficient use of resources. However, a rational processing method has not yet been established which generally meets the diverse and often conflicting demands in terms of the environmental load, efficient use of resources, energy consumption and economy. To make a breakthrough, the Battery Association of Japan (BAJ) is gathering information on new processing technologies for in-depth analysis while making conscious efforts to spread the production of mercury-free dry cells throughout the world, primarily through the overseas plants of Japanese battery manufacturers.[6]

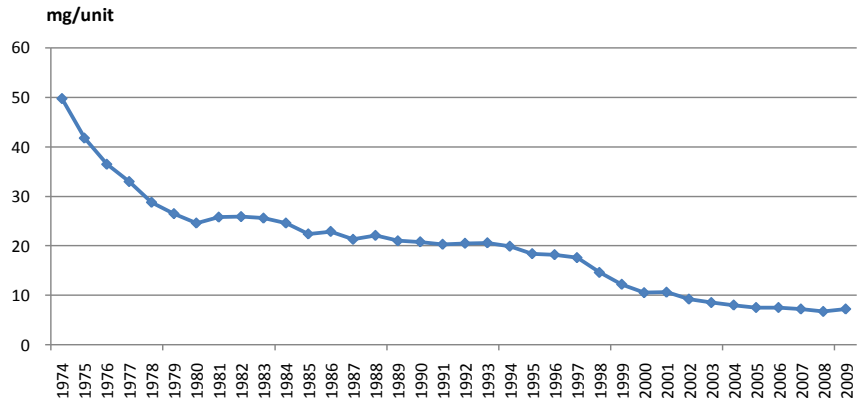
Mercury Demand Reduction in Lamps

The use of a tiny amount of mercury is essential for fluorescent lamps because of the principle of the light generation process which is involved. Unless the minimum and necessary amount of mercury is present inside a fluorescent lamp, the mercury can be depleted during use, possibly resulting in the premature end of the lamp's service life. In view of this, lamp manufacturers have tried to develop a suitable technology to reduce the amount of mercury in a lamp while ensuring its full service life.

As a result, average mercury content in a fluorescent lamp was 50 mg in early 1970s but decreased to approximately 7.5 mg in 2007 (see Fig 13). In Japan, 40 W straight tube-type fluorescent lamps are a subject product for procurement under the Green Procurement Act which was enacted in 2001, and one of the acceptance criteria is that the included amount of mercury is not more than 10 mg per lamp (further details on page 24). Most products of this type sold in the market meet these criteria today.

Efforts are being made to reduce the mercury content of lamps through the continued development of methods to include an accurate quantity of mercury in each lamp, including the adoption of a fixed quantity inclusion method and the use of various types of mercury amalgam, etc (see Column 6).[7]

Fig. 13 Trend of Average Mercury Content in a Fluorescent Lamp in Japan



Source: Japan Electric Lamp Manufacturers Association

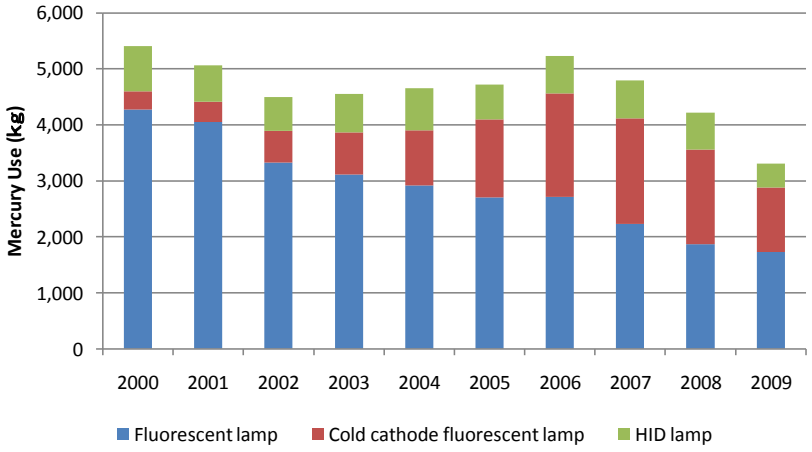
The total consumption of mercury for the production of fluorescent lamps has been more than halved due to the falling production volume, in turn caused by the achievement of a longer service life, in addition to the reduction of the mercury included in each lamp. Meanwhile, the increased production of cold cathode fluorescent lamps for the backlights of liquid crystal (LC) televisions and LC monitors temporarily pushed up the amount of mercury in use. Mercury consumption for this purpose has now fallen because of the

[6] Website of the Battery Association of Japan (http://www.baj.or.jp/e/)

[7] Website of the Japan Electric Lamp Manufacturers Association (http://www.jelma.or.jp/99english/index.htm)

introduction of LED-type backlights. The overall amount of mercury used for various light source products has been declining in recent years (see Fig. 14).

Fig. 14 Trend of Mercury Use in Mercury Containing Lamps

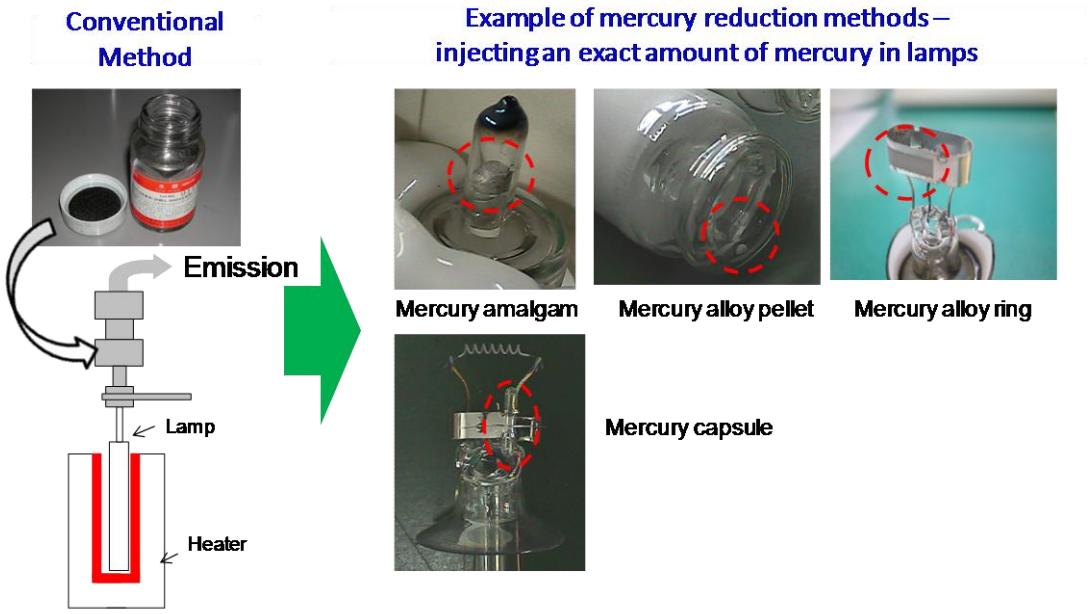


Source: Japan Electric Lamp Manufacturers Association

[Column 6] Efforts to Reduce the Use of Mercury in Lamps

Manufacturers have developed their own technologies to ensure a fixed amount of mercury inclusion in each lamp so that the minimum and necessary amount of mercury is present to suit the required performance of each type of lamp.

Example of Methods for Reducing the Use of Mercury in Lamps



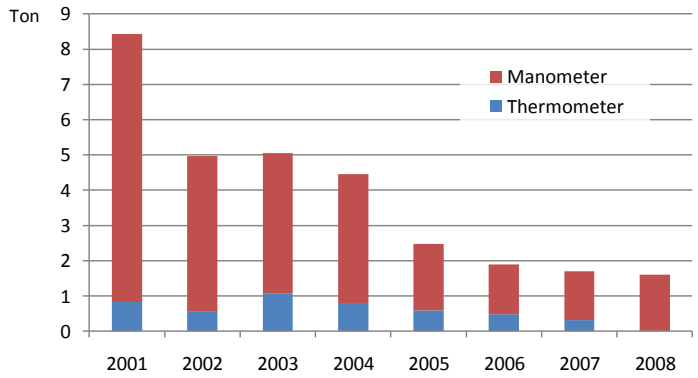
Source: Japan Electric Lamp Manufacturers Association

In Japan, backlights for various lighting apparatus, especially backlights for LC displays, are rapidly being switched to LED-type backlights. The Basic Energy Plan which compiles the energy policies towards 2030 calls for the achievement of 100% flow by 2020 and 100% stock by 2030 regarding the use of high efficiency lighting (use of LEDs, etc.). These figures are presented as concrete targets for the household sector to achieve an energy supply and demand structure which enables low carbon-based economic growth. It is anticipated that the implementation of policy measures to achieve these targets will dramatically advance the use of LEDs for general lighting, greatly reducing the amount of mercury used in lighting apparatus.

Mercury Demand Reduction in Medical Equipment

In the field of medical equipment, mercury has been traditionally used in thermometers, manometers and tooth fillings. Although mercury thermometers and mercury manometers are still used today in some places of medical care, the use of electronic meters becomes more common. Accordingly, the production volume of medical equipments containing mercury is declining (see Fig. 15).

Fig. 15 Trend of Mercury Use in Medical Equipment in Japan



Source: MOE (production data is based on "Annual Reports on Statistics of Production by Pharmaceutical Industry" published by MHLW, and figures are based on an assumed mercury amount of 0.75 g per thermometer and 47.6 g per manometer.)

Mercury demand for dental amalgam was about 5,200 kg[8] in 1970 but has been rapidly declining to 700 kg[9] in 1999 and only 100 kg[10] in 2006. According to the UNEP, some 300 - 400 tons of mercury were used globally for dental amalgam in 2005. Based on this figure, Japan's use of mercury for dental amalgam accounted for some 0.03% of the global consumption. This was much lower than the ratio of Japan's population in the global population of some 2% [11].

Mercury Demand Reduction in Inorganic Chemicals

Inorganic chemicals containing mercury have traditionally been used in daily life and industrial processes as shown in Table 5. HgS (cinnabar) has long been used for red pigments to be used in Japanese traditional vermillion ink, and approximately 2,000 kg a year is still produced in Japan. The demand of $HgCl_2$ (calomel) and HgO (mercury (II) oxide) is almost zero in recent years.

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8 "Annual Report on the Environment in Japan", Chapter 1, Section 2, "Accumulated pollution of hazardous substances"

9 Answer to Cabinet questions Vol. 153 No.2 on November 20 2001, "Answer to the questions regarding dental amalgams submitted by Mr. Mitsuru Sakurai, a member of the House of Councilors"

10 Information provided by Japan Dental Trade Association

11 In 2005, Japan's population stood at 12.8 million against a global population of 6,515 million.

Table 5 Inorganic Chemicals containing Mercury and their Usage in Japan

Name of Chemical		Chemical formula	Usage
Cinnabar	Mercury sulfide(II)	HgS	Coloring of craft, paint/pigment, vermilion ink-pad
Calomel	Mercury chloride (II)	$HgCl_2$	Chloroethene (catalyst)*, anode of manganese cell*, medicinal product (sterilization)*
Mercury (II) oxide	Mercury oxide (II)	HgO	Paint/pigment*, reagent, external medicine*
Mercury compound	Mercury sulfate (II), etc.	$HgSO_4$, etc.	Reagent

*No longer used in Japan

Source: MOE

Other Usage of Mercury

The chemical oxygen demand (COD), which is a principal indicator of water quality, can be measured by the dichromic acid (COD-Cr) method or the permanganic acid (COD-Mn) method.

From the viewpoint of the oxidation strength, dichromic acid is stronger than permanganic acid and has the advantage of more accurately determining the level of COD. The COD-Cr method is, therefore, widely used throughout the world although it has a problem of using such pollutants as mercury sulphate and hexavalent chrome as agents. Another problem is the lengthy process of chemical analysis.

In Japan, the Japanese Industrial Standards (JIS) for the plant effluent test adopted the COD-Mn method which does not use mercury in 1964. This COD-Mn method was subsequently selected for the testing of sewage in 1974 and for the testing of drinking water in 1978. The COD-Mn method is also the measuring method used in environmental quality standards and for the water quality monitoring of sea areas and lakes.

Promotion of Recovery, Collection and Management of Mercury contained in Products

The steady increase of the urban population and rapid economic growth in Japan have created such social problems as an acute shortage of disposal sites for the massive quantity of waste produced and environmental pollution by harmful substances. To solve these problems, Japan has been actively promoting the establishment of efficient recycling systems and the environmentally sound treatment and disposal of waste containing mercury. This section outlines the voluntary efforts of industries to collect used products. The efforts to recover mercury from used products and to treat used products in an appropriate manner are also described.

Establishment of a Wide Area Collection and Treatment System for Used Dry Cells and Fluorescent Lamps

In the face of the increasing social concern regarding the emission of mercury from waste incinerators, the MHW issued an instruction to local governments concerning the separate collection of used dry cells and the recovery of mercury in 1985. In response to this instruction, the Japan Waste Management Association prepared the Wide Area Collection and Treatment Programme for Used Dry Cells, etc. (hereinafter referred to as the "Programme") in 1986, targeting used dry cells which were separately collected as part of municipal waste at the time by local governments (except for the secondary cells and button cells), and began the Programme with those municipalities which agreed with the Programme. Used fluorescent lamps were added in the scope of the Programme in FY 1999[12].

Under the Programme, the used dry cells and used fluorescent lamps collected by municipalities are treated

[12] Website of Japan Waste Management Association (http://www.jwma-tokyo.or.jp/)

and disposed of (recovery of mercury and recycling of other materials) by specialist recycling companies.

Both the overall dry cell collection volume and mercury recovery volume steadily increased each year in the early years of the Programme but peaked in 2001 with a gradual decrease since then (see Table 6 and Fig. 16).

Table 6 Amount of Mercury Recovered from Primary Dry Cells under the Programme

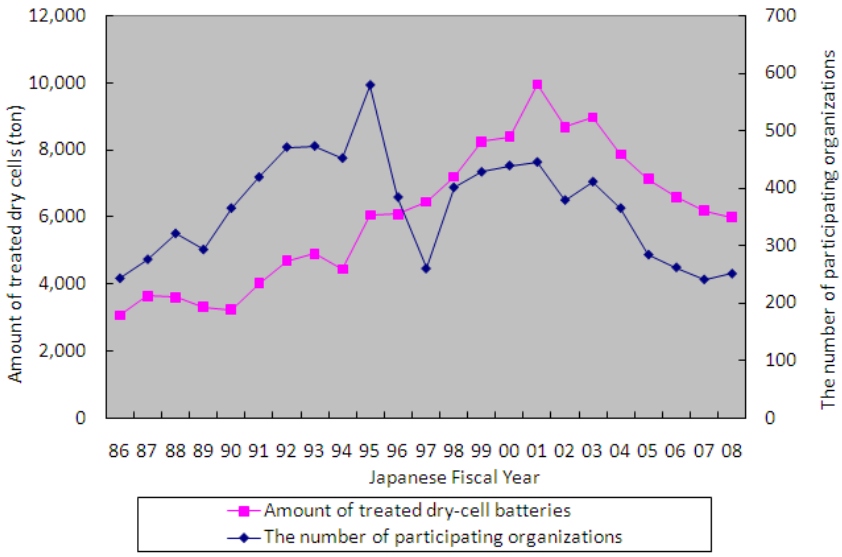
Japanese Fiscal Year	1992	1998	2004	2005	2006	2007	2008
Amount of treated dry-cell batteries (ton)	4,683	7,198	7,866	7,125	6,592	6,188	5,981
Amount of recovered mercury (kg)	702	204	169	107	75	60	58

(Note) (1) The data in this table shows the treatment volume of primary dry cells and the amount of recovered mercury under the Programme.

(2) The amount of recovered mercury is solely from the tube shaped dry-cell batteries; the other type s of batteries, such as button cells or mercury batteries, as well as other waste products containing mercury (e.g., mercury thermometers, electric thermometers, or fluorescent lamps) are not included.

Source: Japan Waste Management Association

Fig. 16 Treatment Volume of Used Dry Cells under the Programme and Number of Participating Organizations



(Notes) (1) The treatment volume in this figure is the volume of treated used dry cells under the Programme.

(2) The number of participating organizations is the total of municipalities and cooperatives for waste management which have treated and disposed of used dry cells using the Programme.

Source: Japan Waste Management Association

Since the commencement of the wide area collection of waste fluorescent lamps in FY 1999, both the number of participating organizations and the recovery volume of mercury greatly increased in five years. Although the number of participating organizations subsequently fell, it has been increasing in recent years. Meanwhile, the recovery volume of mercury has been fairly constant (see Table 7 and Fig. 17).

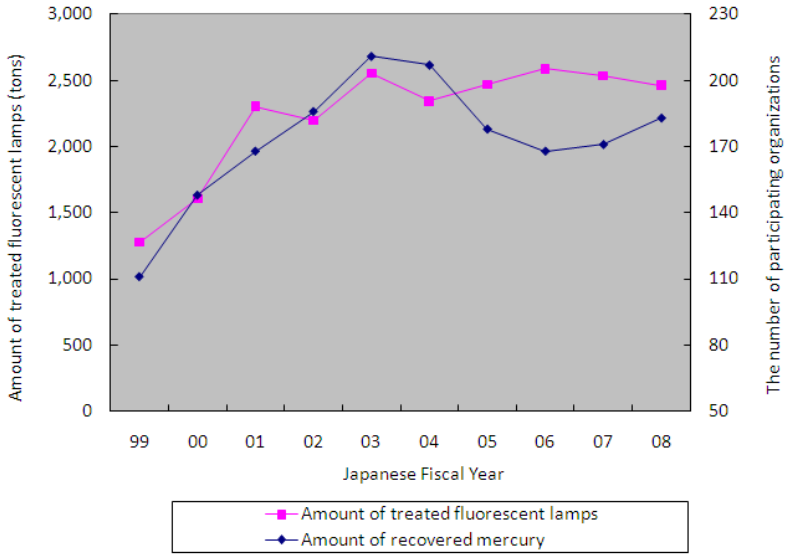
Table 7　Amount of Mercury Recovered from Fluorescent Lamps under the Programme

Japanese Fiscal Year	1999	2001	2005	2006	2007	2008
Amount of treated fluorescent lamps (ton)	1,278	2,226	2,470	2,588	2,534	2,463
Amount of recovered mercury (kg)	14	91	99	104	101	99

(Note) The data in this table shows the treatment volume of used fluorescent lamps and the amount of recovered mercury under the Programme.

Source: Japan Waste Management Association

Fig. 17　Treatment Volume of Used Fluorescent Lamps under the Programme and Number of Participating Organizations



(Notes) (1) The treatment volume in this figure is the volume of treated used fluorescent lamps under the Programme.

(2) The number of participating organizations is the total of municipalities and cooperatives for waste management which have treated and disposed of used fluorescent lamps using the Programme.

Source: Japan Waste Management Association

Collection of Used Fluorescent Lamps by Manufacturers

In the past, used fluorescent lamps generated at business establishments have been either recycled or landfilled as industrial waste by the business owners concerned. However, there is always a risk of illegal dumping or inappropriate treatment. To avoid this risk, several leading manufacturers are providing a leasing service for fluorescent lamps whereby fluorescent lamps are not "sold" but are leased by service agents designated by the manufacturers. Used fluorescent lamps are collected by the agents and are properly recycled via intermediate treaters while new replacement lamps are supplied to customers. Today, this service is enjoyed not only by business establishments but also by plants, theme parks and other premises.

The target used fluorescent lamps of this service are collected in their original form. The fluorescent powder, caps and mercury of fluorescent lamps are recycled to cover soil, aluminium and inorganic chemicals respectively. In regard to the glass, while it is commonly recycled to produce glass wool, light weight aggregate, tiles and others, some fluorescent lamp manufacturers use the recycled glass in an exclusive melting furnace to produce glass for fluorescent lamps, thereby achieving a recycling path from fluorescent lamps to fluorescent lamps.

As the fluorescent lamps of this service are owned by the service agent, customers can enjoy the advantage

of not being required to produce a manifest based on the principle of producer responsibility. There is also a tracking system via the Internet where service agents, intermediate treaters, manufacturers and customers can check the treatment progress of collected used fluorescent lamps. This system has been developed to guarantee the environmentally sound treatment and recycling of used fluorescent lamps.

Collection of Used Fluorescent Lamps Based on the Recycling Act

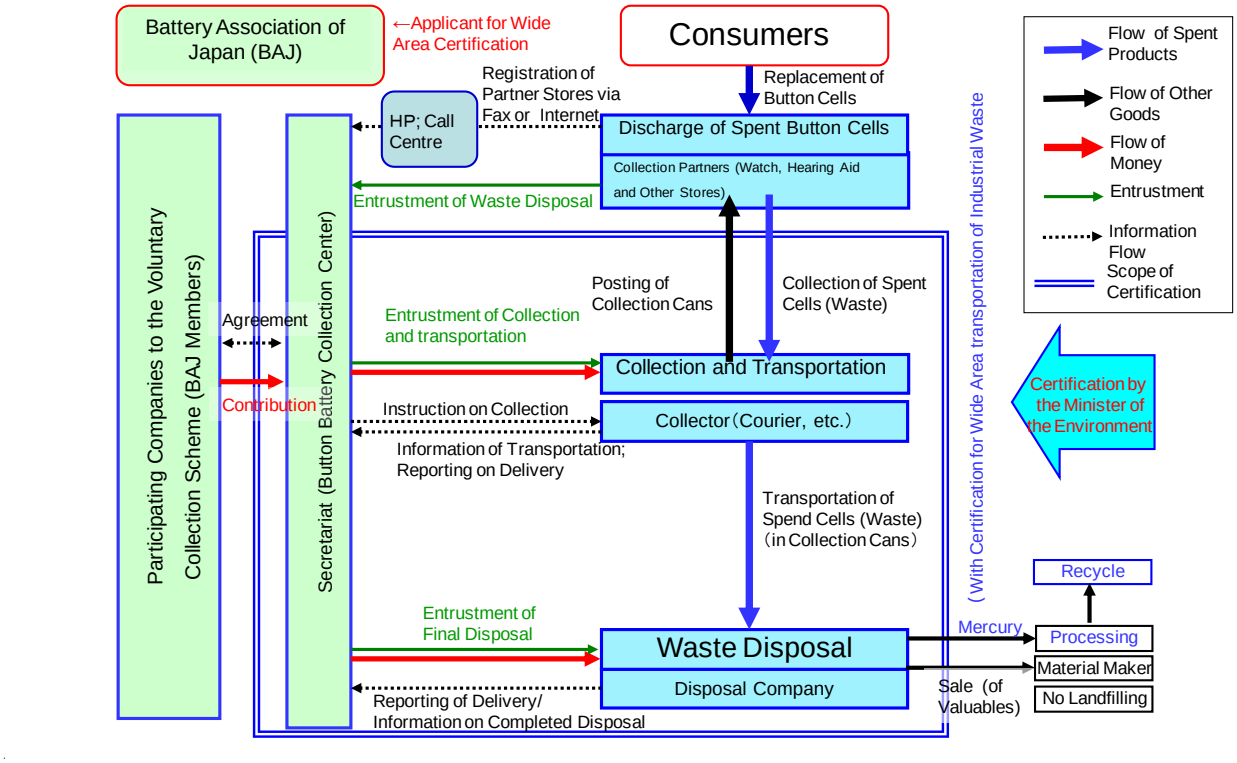
As described earlier, LEDs have rapidly become the first choice for the backlights of LC televisions as well as LC display units. However, many of these appliances which are currently disposed of use fluorescent lamp backlights. Manufacturers and others are engaged in the recycling and/or sale of resources recovered from home use LC televisions (pursuant to the Act on Recycling of Specified Types of Home Appliances) and notebook PCs and LC display units (pursuant to the Act on Promotion of Effective Utilisation of Resources). In the recycling process, the cold cathode fluorescent lamps for backlights are removed and handed over to a treater for the proper treatment and recovery of mercury.

Voluntary Collection of Used Button Cells by Manufacturers

The battery industry has long been making conscious efforts to reduce the environmental load through the development of mercury-free cells and termination of the production and sale of mercury cells and other actions as described earlier. In the case of button cells, however, a minute quantity of mercury is still used on performance and quality grounds. For some time, manufacturers of button cells had conducted the voluntary collection of used cells from their retail partners in the form of "trade-in". However, this system had the inherent problem that the total collection volume was low because of the difficulty of clearly understanding the entire picture, including the state of the installation of collection boxes at individual stores.

To rectify this situation, the BAJ established the Button Battery Collection Center in April 2009 to unify the management of the voluntary collection by the industry. At present, the Centre registers retail stores selling button cells as cooperating stores, distributes collection cans to these stores and regularly collects the used button cells deposited in these cans. The collected cells are separated at a factory and are ultimately forwarded to a facility run by an intermediate treater. As the used cells are entirely recycled in the form of mercury, iron and zinc compounds, neither final disposal nor landfilling takes place (see Fig. 18).

Fig. 18　Scheme of Voluntary Collection of Button Cells by BAJ

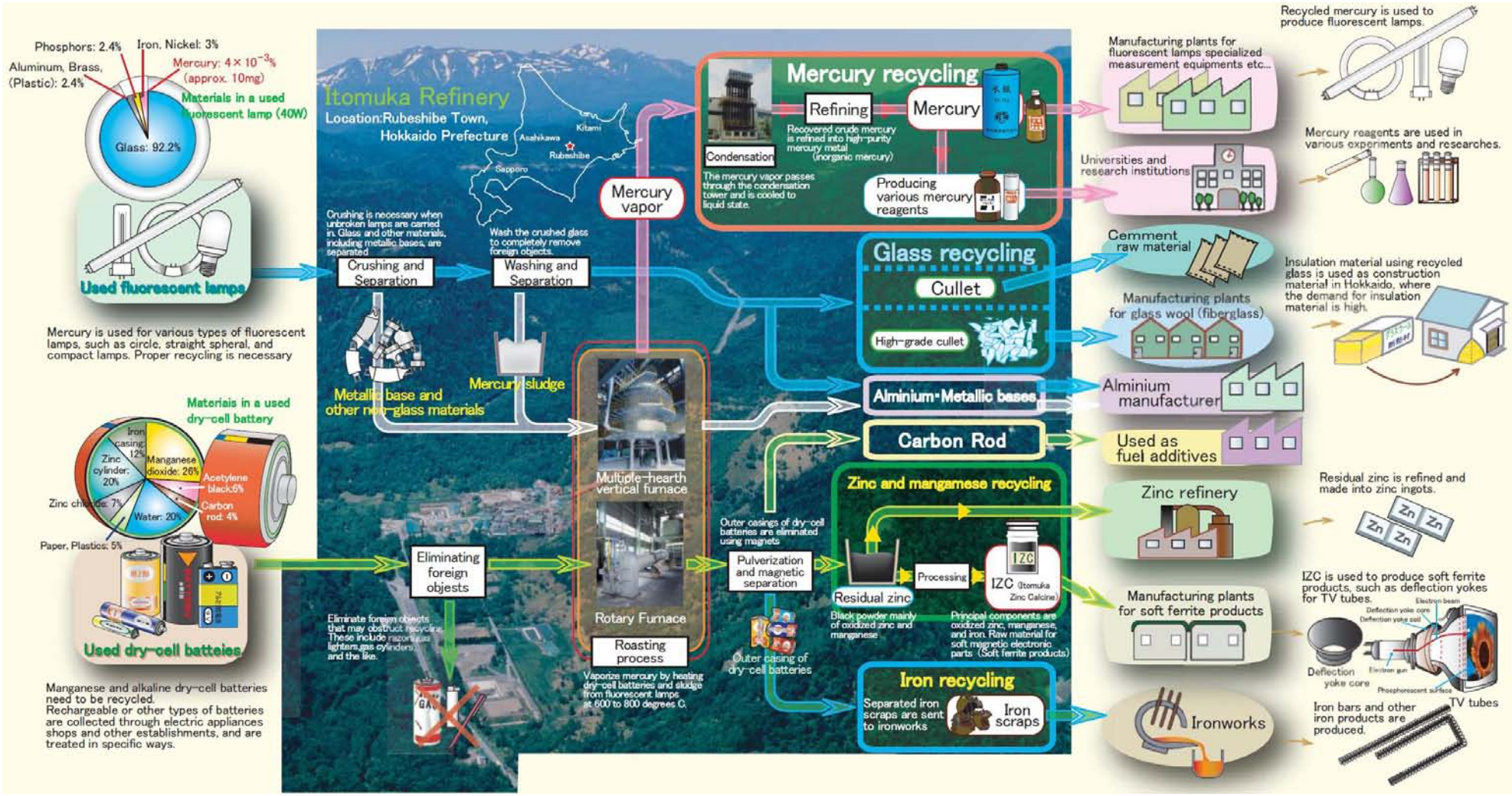


Source: Battery Association of Japan

[Column 7] Mercury Recovery, and Environmentally Sound Treatment and Recycling of Mercury Containing Product at a Place of Mining Business in Japan

Used dry cells sent to a place of mining business in Japan undergo the roasting process for the recovery of mercury. After roasting, the outer shells and zinc sludge are recycled to produce iron products and soil improver or zinc ingots respectively. The used fluorescent lamps are firstly crushed, and washed glass is then recycled as a raw material for the heat insulation of homes or new fluorescent lamps while the aluminium end caps are recycled as raw aluminium. Mercury is also recovered from the wastewater generated in the washing process. At this particular place of mining business, mercury and other substances are also recycled from other products containing mercury, such as button cells.

Recycling of Used Products Containing Mercury and Recovery of Mercury at a Place of Mining Business



*This figure will be updated shortly.

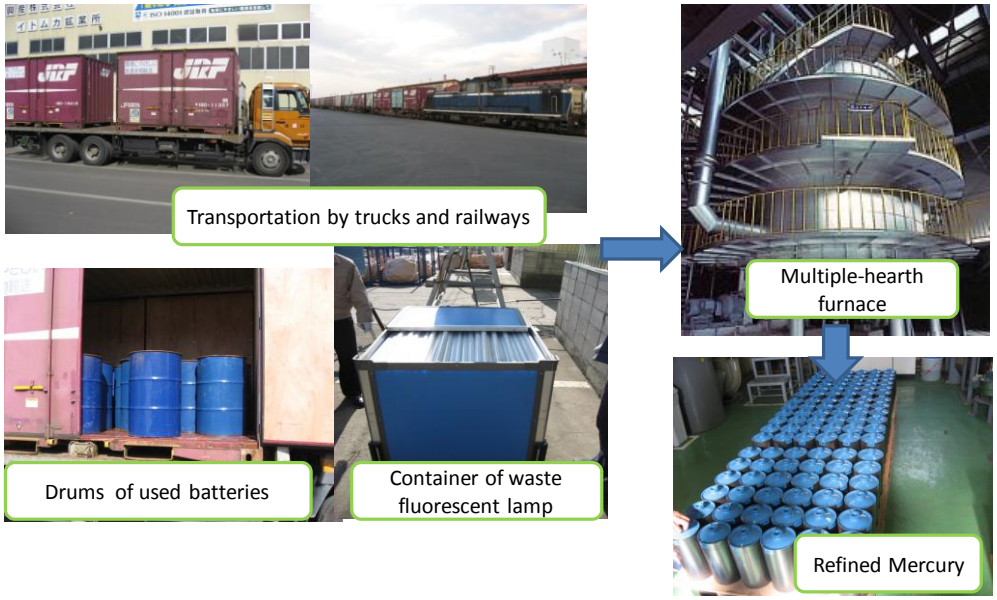
Recycling of Used Products and Recovery of Mercury at a Former Mine

In Japan, used products containing mercury, which are collected through the voluntary collection by manufacturers or separate waste collection operation by local governments, are recycled or treated and disposed of in an environmentally sound manner. Many of these used products are actually recycled at the place of a mining business in Hokkaido. The premises in question cover an area of 1,489,431 m^2 in the Taisetsu Mountain Range and used to be known as the top mercury mine in the East, producing 200 tons of mercury a year at its peak time. When mining operation was in full swing, the population exceeded 5,000, forming a mining company town.

With the declining demand for mercury, the mine was closed. The company decided to move into the environmental business of treating used products containing mercury in 1973 using the mercury refining technology and other technical know-how developed through the earlier mercury mining business. In 1983 when the use of mercury in dry cells became a social problem, the company was designated as the only company capable to treat used dry cells in Japan.

Today, this place of mining business processes various used products, primarily dry cells and fluorescent lamps, for recycling (see Fig. 19). Some 15 tons of mercury are recovered every year from used cells and lighting apparatus with an additional some 75 tons of elemental mercury being recovered as a refining by-product. This is the only place in Japan producing elemental mercury and the produced mercury is re-used for fluorescent lamps, measuring instruments and other products.

Fig.19 Recovery of Mercury from Used Product at the Former Mine



Source: MOE

Environmental Technologies for Emission Control

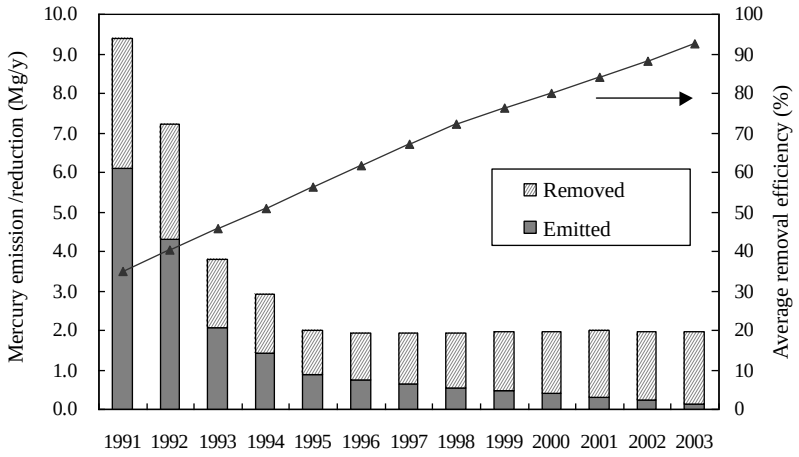
Mercury Reduction Effect of Major Air Pollutants Control Measures (SOx, NOx, Dioxins)

In Japan, the emission standards for dust, SOx, NOx, hydrogen chloride and dioxins are stipulated by the Air Pollution Control Law and the Act on Special Measures against Dioxins. However, there are no comparable standards for mercury. Nevertheless, achievement of the emission standards for the major air pollutants, especially measures to control dioxins, has helped the decline of the mercury concentration of flue gas.

For example, a study has found that the rate of mercury removal from flue gas from a solid waste incineration plant has improved from 22% before the introduction of a dioxin control measure to 96.7% after the introduction of the said measure.[13] Prior to the introduction of the dioxin control measure, flue gas was treated by an electrostatic precipitator and a wet scrubber. The new system has a cooling tower to replace the electrostatic precipitator and to lower the temperature of the flue gas. After dust collection by a bag filter, activated carbon is injected. The system also has a better combustion performance through control of the carbon monoxide concentration and other measures. The result is a decline of the dioxin concentration, and the original mercury concentration in flue gas of 0.047 mg/m^3 has been reduced to less than 0.01 mg/m^3.

Fig. 20 shows that the changes in mercury removal efficiency of the flue gas treatment systems in municipal waste incineration plants, and it is reported that the mercury removal efficiency in 2003 is about 92.5%. It can be found that mercury removal efficiency was significantly improved compared with 34.5% removal efficiency in 1991. The Act on Special Measures against Dioxins enacted in 1999 has facilitated the shifting from wet scrubber and electrostatic precipitator to an activated carbon injection system and bag filter for municipal solid waste incinerators. Because of the excellent mercury removal function of activated carbon, this system is believed to have improved the mercury removal efficiency.

Fig. 20 Changes in Mercury Emissions and Removal Efficiency (National Average) of the Municipal Waste Incineration Facilities



Source: Kida, A., Sakai, S.,Takaoka, M., Hirai Y., Moritomi, H., Yasuda K. Study on Air Emission Inventory of Mercury Including Waste Management Processes and Emission Reduction Measures, K1852, 2007.

Achievements and Current Situation of Various Efforts

Closure of Mines Due to Declined Demand

The strict control of the use of mercury based on the lessons learned from Minamata Disease and other incidents of pollution damage in Japan led to the steady closure of mines which had traditionally produced natural mercury (inorganic mercury). All domestic mining companies had ceased mining production by the end of 1974.

[13] Shin-ichi Sakai, Akiko Kida, Shigehiro Shibakawa, Akihiro Matsumoto, Hajime Tejima, Nobuo Takeda. Co-benefit of Controlling Unintentional Persistent Organic Pollutants (UPOPs) in Municipal Solid Waste Incineration, in 4th i-CEPEC, September 26-29, 2006, Kyoto, Japan.

From the late 1960s to the 1970s, the production of caustic soda accounted for more than half of the mercury consumption. The shift from mercury process to non-mercury processes in the caustic soda production had the most significant effect on the reduction of the demand for mercury.

Implementation Situation of Mercury Monitoring and Results

The nationwide monitoring of air and water is being conducted throughout Japan to check the state of achievement of the environmental quality standards or guideline values for mercury in the general environment. The latest monitoring results indicate that the environmental quality standards are exceeded in groundwater and soil at some locations but that all of the standards or guideline values are met in public water areas and air at every single monitoring point. In the case of public water areas, the relevant environmental quality standards have never been exceeded since FY 1997 at all of the monitoring points. In regard to air, none of the guideline values have been exceeded since FY 1998 when the full-scale monitoring of air started (see Table 8).

Table 8　Results of Mercury Monitoring in Japan

Subject	Standard Value	Monitoring Results	Monitoring Frequency; Year
Air	Guideline value : mercury (mercury vapour $\leqq$ 40 ngHg/m^3 (annual average value)	Monitoring results of hazardous air pollutants -Number of monitoring points where the guideline value is exceeded: none out of 293 points; average concentration of 2.1 ngHg/m^3; highest concentration recorded: 8.3 ngHg/m^3	Monthly; FY 2008
Public water areas	Environmental quality standard: total mercury $\leqq$ 0.0005 mg/l* (annual average value)	Water quality monitoring at public water areas (measurement of total mercury) -Number of monitoring points where the environmental quality standard is exceeded: none out of 4,182 points	Monthly in general; FY 2008
Ground water	Environmental quality standard: total mercury $\leqq$ 0.0005 mg/l* (annual average value)	Groundwater quality check -Number of monitoring points where the environmental quality standard is exceeded: outline survey (2 out of 2,944 boreholes); survey on areas near contaminated boreholes (5 out of 71 boreholes); regular monitoring (25 out of 275 boreholes)	Monthly in general; FY 2008
Soil	• Environmental quality standard: total mercury of 0.0005 mg or less per litre of test solution • Elution standard: mercury and its compounds of 0.0005 mg/l or less and no detection of alkyl mercury • Content standard: mercury and its compounds $\leqq$ 15 mg/kg	Soil contamination surveys (including those surveys not based on the law) -Number of cases where the environmental quality standard and others are exceeded: 39 cases**	FY 2008

* There is an environmental standard of "not detected" for alkyl mercury, and none of the monitoring points show the presence of alkyl mercury.

** The results for soil are not the results of regular monitoring but show the number of cases where a soil contamination survey found that the relevant environmental quality standard is exceeded.

Source: MOE

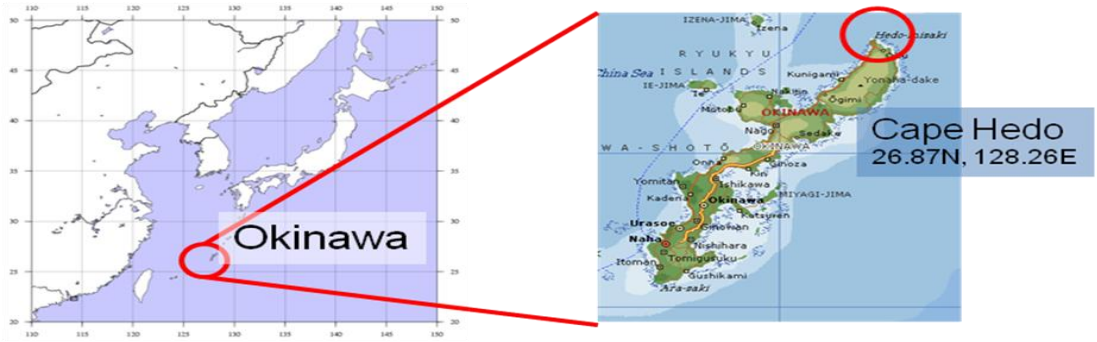
Continuous Monitoring of Mercury Concentration in Air

In Japan, a pilot project for the continuous monitoring of mercury in air was first conducted in February 2007 at the Cape Hedo Aerosol and Atmosphere Monitoring Station (CHAAMS) in Okinawa Prefecture using a specially designed Hg monitor. This was followed by the commencement of continuous monitoring in October of the same year up to the present (see Fig. 21 and Fig. 22).

This project aims at contributing to the following matters.

- ✧ Monitoring of the concentration of mercury and other heavy metals contained in air, particles and precipitation
- ✧ Acquisition of useful information on the long range transport of trace elements in the Asia-Pacific Region
- ✧ Establishment of monitoring technologies
- ✧ International cooperation for monitoring of the atmospheric environment

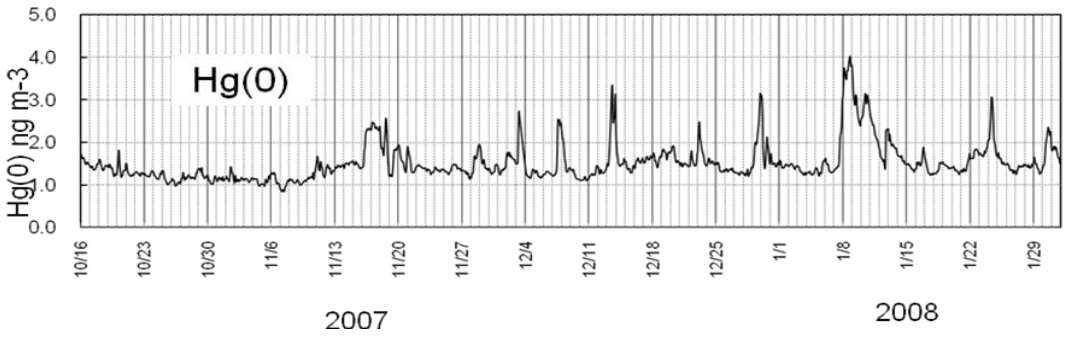
Fig. 21 Location of Cape Hedo Aerosol and Atmosphere Monitoring Station



Source: MOE

The continuous monitoring results so far show that the mercury concentration in air is below the guideline value (40 ngHg/m^3) by one order.

Fig. 22 Continuous Monitoring Results of Mercury Concentration in Air at the CHAAMS



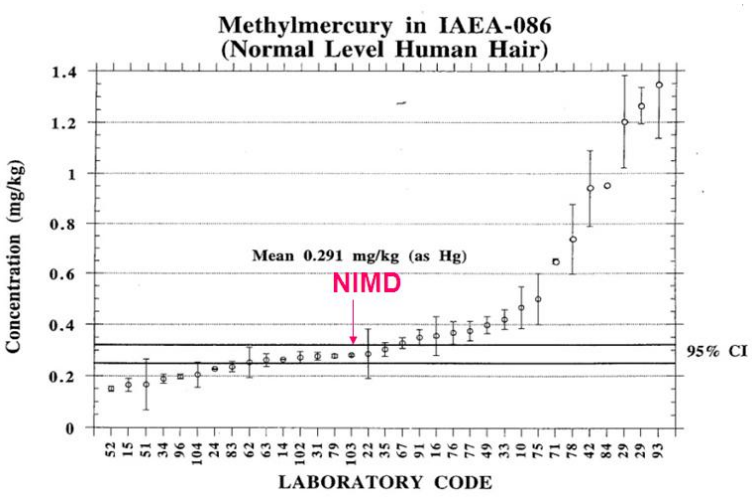
Source: MOE

[Column 8] Methylmercury Analysis in National Institute for Minamata Disease (NIMD)

Most biological samples, including human/blood and fish, contain both methylmercury (MeHg) and inorganic mercury (I-Hg). For exposure assessment and risk assessment, not only total mercury (MeHg + I-Hg) analysis but selective quantification of MeHg of the samples is necessary. The total mercury analysis can be successfully performed using an atomic absorption detector. For selective quantification of MeHg, an electron capture detector-gas chromatography (ECD-GC) is used after the extraction of MeHg to organic solvent such as toluene. However, it was difficult previously to obtain an exact analytical result due to incomplete extraction of MeHg using an organic solvent. The National Institute for Minamata Disease (NIMD) has established a novel technique to improve the extraction efficiency up to nearly 100% with the use of dithizone /toluene as a solvent. Currently, the NIMD provides MeHg analysis data of high quality in various samples, including environmental samples such as seawater and soil. The technique has been transferred to mercury scientists in such countries as Brazil, Tanzania, Nicaragua, Indonesia and Korea through international cooperation activities of the NIMD, and been used in MeHg analysis there. Detail of the method is available on the NIMD website:

(URL: http://www.nimd.go.jp/kenkyu/docs/march_mercury_analysis_manual(e).pdf)

Apparatus: ECD-GC



Intercomparison exercise: MeHg in IAEA-086 (Human Hair)

NIMD method can accurately analyze the values of MeHg. The circles inside the graph indicate the measured values by laboratories in various countries. The range in the graph indicates 95% confidence interval.

Mercury Emission Inventory

The total emission volume of mercury into air from anthropogenic and natural sources in Japan was estimated to be 22 - 31 tons in 2005 based on a report by Kida et al.(2007)[14] and data provided by related industries (see Table 9).

In the combustion sector, the major contributors were coal-fired power plants, oil burning industrial boilers and the incineration of medical waste, sewage sludge and other industrial waste. In the manufacturing sector, primary ferrous metal production, non-ferrous metal production and cement production were estimated to be major contributors.

Table 9 Mercury Emission Inventory of Japan (2005)

Category	Sub-category		Atmospheric mercury emission [ton/yr]
Combustion	Coal combustion	Power plants	1.229
		Industrial boilers	0.569
	Oil combustion	Power plants	0.299
		Industrial boilers	1.05
	Incineration of municipal waste		0.098-0.236
	Incineration of medical waste		0.57-1.68
	Incineration & melting of sewage sludge		0.258-1.48
	Incineration of industrial waste	Plastics waste	0.017-0.657
		Paper waste	0.0055
		woodchip	0.013-0.116
		Waste textile	0.0033-0.011
		Waste Rubber	0.000021-0.0019
		Other sludge	0.661
		Shredder residue	0.049-0.793
Production	Primary ferrous metal production		3.26
	Non-ferrous metal production		0.52[*1]-4.61
	Cement production		8.94[*2]
	Limestone production		1.06
	Carbon black production		0.121
	Coke production		0.886
	Pulp and paper production		0.427-0.652
	Chlor-alkali production		0
	Battery manufacturing		0.00183
	Electrical switch manufacturing		0.00433
	Manufacturing fluorescent lamps		0.018
	Other manufactures		-
Others	Crematoria		0.056
	Fluorescent lamps recycling and processing		7.23×10^{-6}-9.03×10^{-6}
	Dental(amalgam)		0.003
	Landfill gas		-
	Transportation (fuel combustion)		0.773
Natural sources	Volcanoes		>1.4
	Forrest fires		-
Secondary emission	Agriculture		-
Influx from other regions			-
Total			22.292-30.574

Source: MOE (Estimated by the Ministry using the technique of Kida et al. (2007). Some data estimated by industrial bodies are also included.)

[14] Akiko Kida, Yasuhiro Hirai, Shin-ichi Sakai, Hiroshi Moritomi, Masaki Takaoka, Kenji Yasuda. "Study on Air Emission Inventory of Mercury including Waste Management Processes and Emission Reduction Measures", K1852, 2007.

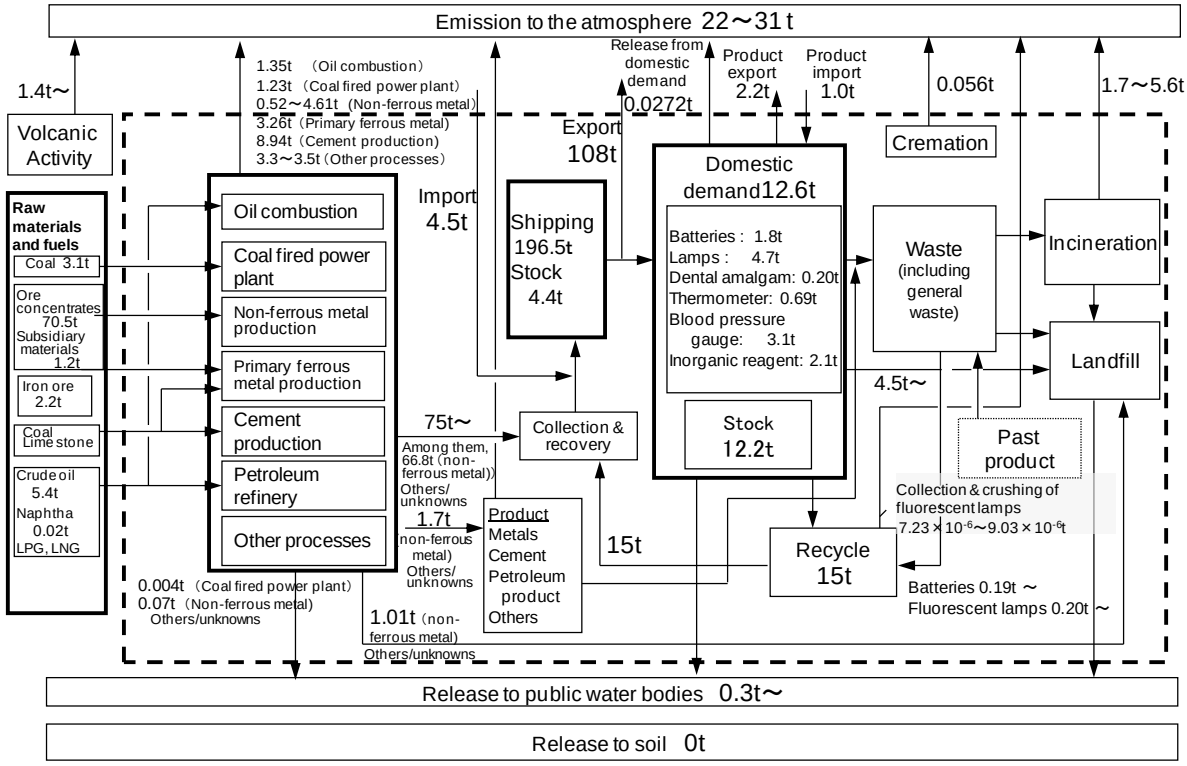
Material Flow of Mercury

The MOE has prepared a material flow of mercury to clarify the flow of mercury in human society, including the use of mercury for production activities and the discharge of mercury to air, water and soil. Fig. 23 shows the material flow of mercury in Japan using the values observed from 2002 to 2006.

According to this figure, some 82.4 tons of mercury were imported as a constituent of such raw materials as coal, oil and mining ore with some 1 ton of mercury was imported as a constituent of products. Some 4.5 tons were further imported as elemental mercury. Meanwhile, the domestic demand for mercury for products was 12.6 tons. Some 108 tons of mercury were exported as elemental mercury and some 2.2 tons of mercury were exported as a constituent of products.

The above figures mean that the supply volume of mercury through recovery, etc. is larger than the domestic demand, resulting in the export of surplus mercury. As international discussions will be further promoted on the reduction of international trade in mercury and on the storage of surplus mercury, it is currently planned to discuss desirable mechanisms for mercury recovery and long-term storage or disposal in Japan.

Fig. 23 Material Flow of Mercury in Japan



Source: MOE (values observed from 2002 to 2006 are used)

Part 3 Promotion of International Cooperation

International Initiatives

Japan as the Lead Country in the Waste Management Area of the UNEP Global Mercury Partnership

Mercury Waste Management Area of the UNEP Global Mercury Partnership currently has 47 partners consisting of national governments, international organizations and NGOs. Several activities to manage mercury waste have been conducted under the Partnership.

Japan is acting as the lead country in the area of mercury waste management and has been actively contributing to the partnership programme, including taking a leading role in the preparation of a document compiling excellent cases of mercury waste management as a useful reference for the efforts of developing countries.

The 2nd Waste Management Partnership Area Meeting (Tokyo, March 2010)

Preparation of Technical Guidelines under the Basel Convention

Japan is also the lead country for the work to prepare the Technical Guidelines for Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing or Contaminated with Mercury following a decision at the 8th Conference of the Parties to the Basel Convention held in 2006. Work has been earnestly in progress in collaboration with the Parties to the Convention, experts, NGOs and other stakeholders with a view to adoption of the guidelines at the 10th Conference to be held in October 2011.

Other International Contributions

Assistance Provided by the JICA for Developing Countries

The Japan International Cooperation Agency (JICA) has been active in the development of human resources to be involved in the fight against mercury by national governments and various organizations concerned. Concrete cases include such technical cooperation projects as the "Project to Strengthen the Health Vigilance System on Methylmercury in Tapajos River Basin" in Brazil and the "Project for Ecological Monitoring on Mercury in the Nura River Basin" in Kazakhstan and the implementation of training courses featuring "countermeasures for pollution caused by harmful metals, etc." and "experiences of and lessons learned from Minamata Disease".

International Negotiations Towards Mercury Convention

In May 2010, the then Prime Minister Hatoyama attended the Memorial Service for the Victims of Minamata Disease as the first Prime Minister of Japan to do so and offered "prayers" as described earlier. In the prayers, he expressed his determination to actively contribute to preparing for an international convention with the aim of preventing mercury pollution so that health damage and environmental destruction such as that caused by Minamata Disease would never be repeated in any other country. To achieve this aim, he explained Japan's willingness to host the second session of the Intergovernmental Negotiating Committee to prepare a global legally binding instrument on mercury (INC 2) as well as

Japan's determination to pledge to the world the action to prevent mercury pollution, naming the "Minamata Convention" by hosting the Conference of Plenipotentiaries in Japan to be held in 2013 to adopt and sign the convention (see Appendix 2).

At the first session of the Intergovernmental Negotiating Committee to prepare a global legally binding instrument on mercury (INC 1) held in Sweden in June 2010, Japan stated its commitment as a country which has experienced Minamata Disease to actively contributing to the successful outcome of the negotiations and to reducing the risk posed by mercury by means of sharing its knowledge, experience, pollution control measures and technologies developed based on the said knowledge and experience and alternative technologies. As part of Japan's commitment, Japan repeated its willingness to host the Conference of Plenipotentiaries scheduled in the second half of 2013 as well as the INC 2 and suggested that the convention be named the "Minamata Convention".

In this process of negotiations, Japan is contributing to the advancement of discussion as the coordinator for the Asia-Pacific Region to assemble and represent the opinions of countries in the region.

Concluding Remarks

Japan currently produces no mercury from primary mining, and the consumption of mercury has been reduced to some one two hundred and fiftieths of the peak-time consumption in 1964 through the conscious efforts of industries and other stakeholders. Efforts to make mercury-free products are still continuing, and it is expected that the demand for mercury in Japan will further decline in the coming years. Meanwhile, used products containing mercury are actively collected with the cooperation of citizens, local governments, industries and others. Along with mercury contained in industrial by-products, mercury in products is recovered by an environmentally sound method using appropriate technologies developed over the years. Japanese society today is one in which everyone can enjoy life with little threat of mercury to the environment and human health as a result of the conscious and committed efforts of all actors.

Japan's high economic growth period, however, set economic growth as a priority over the environment and human health. Having learned vital lessons from the misery caused by Minamata Disease and other painful manifestations of pollution as a consequence of this misconceived priority, pollution control measures and environmental policies made giant steps forward although Japan paid an incalculable price in the process. Even after more than 50 years since the official acknowledgement of Minamata Disease, there are still victims suffering from the symptoms of Minamata Disease and those with concerns regarding their health.

It is Japan's sincere wish to see other countries becoming fully aware of the importance of environmental consideration based on Japan's experiences and lessons learned, and establishing a sustainable society without experiencing the misery of pollution, such as Minamata Disease, while preventing environmental pollution. To achieve this wish, Japan, a country that experienced Minamata Disease, is determined to continually provide its knowledge and technologies based on its own experience to the rest of the world in order to contribute to reducing risks posed by mercury and to realising the "Minamata Convention". It will also make efforts to establish a society which is free from health damage and environmental pollution caused by harmful substances.

Appendix

1. Timline of Minamata Deisease

1956	May	The Minamata Disease was officially acknowledged.
1957	Mar.	The Health Science Research Team under Ministry of Health and Welfare (MHW) prepared a report and estimated that the cause of disease is a type of chemical substances or heavy metals. The Committee for Countermeasures Against Strange Disease in Minamata City held the first meeting (The committee later renamed itself the "Committee for Measures").
	Aug.	The Fishermen's Cooperative in Minamata City began voluntary fishing restraint. The Kumamoto Prefectural Government requested the MHW to decide on the legality of a policy of the total prohibition of fishing in Minamata Bay with the application of the Food Sanitation Act (The MHW responded that the said policy could not be legally enforced.).
1958	Sep.	Chisso changed the route of the acetaldehyde effluent drainage from Hyakken Port to Hachiman Pool; effluent was then discharged into the mouth of Minamata River.
1959	Mar.	Outbreaks of the disease occurred around the mouth of Minamata River and the northern area. Two laws related to water quality control were enacted.
	Jul.	The Minamata Disease Study Team of the Faculty of Medicine, University of Kumamoto reported that the substance causing Minamata Disease was an organomercury compound (however, many scientists presented counterargument in regard to this organic mercury theory.)
	Oct.	The Ministry of International Trade and Industry ordered Chisso to stop discharges into the Minamata River as well as to complete wastewater treatment facilities.
	Nov.	Chisso stopped discharge into the mouth of the Minamata River. “The Ministerial Liaison Conference on Countermeasures for the Minamata Food Poisoning” was held The Food Sanitation Investigation Council of the MHW reported that the cause of Minamata Disease is a type of organic mercury compound (source of organic mercury was not mentioned). The Special Committee on the Minamata Food Poisoning under the Food Sanitation Investigation Council was dissolved.
	Dec.	Chisso installed a coagulation sedimentation system at the Minamata plant. Chisso and the Federation of Fishermen's Cooperative in Kumamoto Prefecture agreed to sign compensation agreement. Chisso and the Mutual Help Group of Households with Minamata Disease Patients agreed to sign consolation payment agreement.
1965	May	Niigata Minamata Disease was officially acknowledged.
1967	Apr.	The Special Investigation Team on Mercury Poisoning in Niigata under the MHW submitted a report which identified that the cause of the disease is discharge from Showa Denko.
	Jun.	The first Niigata Minamata Disease lawsuit (The District Court decided in favor of the plaintiffs in September 1971)
1968	May	Chisso stopped manufacturing of acetaldehyde.
	Sep.	The government announced the consensus opinion on the cause of Minamata Disease.
1969	Jun.	The first Minamata Disease lawsuit (The District Court decided in favor of the plaintiffs in March 1973).
	Dec.	“The Act on Special Measures Concerning Relief for Health Damage by Pollution” was enacted.
1971	Aug.	Vice-Minister of the Environment Agency issued Notification concerning the Act on Special Measures Concerning Relief for Health Damage by Pollution.
1973	Jul.	Chisso and patients reached the agreement on compensation (in June agreement was made between Showa Denko and patients of Niigata Minamata Disease).
1974	Sep.	“The Act Concerning Compensation and Prevention of Pollution-Related Health Damage” was enacted.
1977	Jul.	Director General of Environmental Health Department, Environmental Agency issued Notification concerning “Certification Criteria for Acquired Minamata Disease”.
	Oct.	Chisso, the national government and the Kumamoto Prefectural Government began the Minamata Bay Pollution Prevention Project. Bottom sediment exceeding 25 ppm of total mercury was treated (the project completed in 1990).
1991	Nov.	The Central Council for Environmental Pollution Control compiled a report "Desirable Future

		Measures to Deal with Minamata Disease".
1995	Sep.	The three ruling parties decided on “Settlement of Dispute of Minamata Disease (final settlement)”.
	Dec.	The Cabinet approved “Measures to Deal with Minamata Disease”.
		The Cabinet approved “The Prime Minister’s Statement on Settlement of Dispute of Minamata Disease”.
1996	May	The plaintiffs of the 10 lawsuits withdrew their actions (only the Kansai lawsuit was unsettled and continued).
1997	Oct.	The Kumamoto Prefectural Government removed dividing nets (installed in 1974).
2000	Feb.	The Cabinet approved "Support Measures for Chisso from FY 2000 Onwards".
2004	Oct.	The Supreme Court handed down decision in the Kansai lawsuit (both the national and prefectural governments' responsibility is affirmed).
2005	Apr.	Ministry of the Environment (MOE) announced “On Future Minamata Disease Countermeasures”.
	May	40 years of Niigata Minamata Disease since officially acknowledged
2006	May	50 years of Minamata Disease since officially acknowledged
2009	Jul.	“The Act on Special Measures Concerning Relief for Victims of Minamata Disease and Solution to the Problem of Minamata Disease” was promulgated and enacted.
2010	Mar.	The Shiranui lawsuit (Kumamoto District Court) reached a basic agreement for an amicable settlement (a similar basic agreement was reached at the Niigata District Court in October and at the Osaka District Court and Tokyo District Court in November of the same year).
	Apr.	The Cabinet decided on “the implementation policy for relief measures” stipulated by the Act on Special Measures Concerning Relief for Victims of Minamata Disease and Solution to the Problem of Minamata Disease.
	May	The acceptance of applications for relief started.
	Oct.	Provision of a lump sum payment to eligible persons started based on the implementation policy for relief measures.

2. Prayers by the Prime Minister at the Memorial Service for Victims of Minamata Disease on May 1, 2010

(provisional translation)

On this solemn occasion of the Memorial Service for Victims of Minamata Disease, I would like to express my heartfelt condolences for those who lost their precious lives.

Today, I am truly full of emotion to know that I am the first Prime Minister in Japan to attend this annual Memorial Service.

Visting Minamata and seeing the sea, which is so beautiful that Roka Tokutomi, a great writer in Minamata in the Meiji Era, called it "a vibrant oil painting", I cannot help but feel a deep sense of sorrow for the pollution of such a splendid place, for the serious damage to human health and for the destruction of community bonds through segregation, prejudice and discord.

It is regrettable that Minamata Disease occured not only in Kumamoto and Kagoshima but also in Niigata as a second incident of Minamata Disease. I am extremely sorry to those who passed away after a long painful struggle, their bereaved families, those who gravely suffered from friction within the community and those who continue to suffer today.

Representing the government, I accept responsibility for the failure to fully perform the duty of preventing pollution as well as the spread of Minamata Disease, and I would like to express my sincere apology once more. My visit to Minamata and attendance at today's Memorial Service have reminded me of the need of the government to fulfill its responsibility to properly compensate the victims.

On May 1, 1956, 54 years ago today, Dr. Noda of Chisso Hospital rushed to the Minamata Health Centre to report his meeting with a patient. The discovery of Minamata Disease patients in Niigata was announced on June 12, 1965.

Many people have been working hard to solve the problem of Minamata Disease in this long period of 54 years since its official acknowledgement, but some big issues still remain unsolved.

Particularly pertinent is the existence of many people who are requesting relief today. Many of them are quite old.

The Act on Special Measures Concerning Relief for Vivtims of Minamata Disease and Solution to the Problem of Minamata Disease has been enacted because of the urgent need to improve the situation.

The Cabinet, led by myself, has held a number of discussion meetings with victims groups and other people concerned to find appropriate solutions and settlements as the embodiment of the Cabinet's motto of "A politic that protects people's lives". The institution of the "Policy for Relief Measures" is the culmination of these efforts. Based on the basic idea of protecting human life, the government is determined to provide swift relief for Minamata Disease victims as much as possible.

With a flood of emotion, I would like to announce the opening of the facility to receive fresh applications for relief from today, 1st of May.

The government has also held a number of meetings with those involved in lawsuits to seek possible amicable settlement. I believe that it is a real achievement to have now reached a basic agreement for an amicable settlement with the No More Minamata plaintiffs group.

However, I have no doubt in my mind that this agreement does not put an end to the problem of Minamata Disease. Rather, I would like to think of today as being a fresh start.

What is important before anything else for a final settlement of the problem is the creation of communities in which not only the victims but also all local residents can live with peace of mind. We are determined to develop a model where passionate engagement in environmental activities leads to the development and healthy growth of local communities. For this purpose, we will be earnestly proceeding with medical care and welfare measures for fetal patients and others, health monitoring of those with health concerns and rehabilitation, more specifically the *Moyai-naoshi* movement, of community bonds to create a better future in collaboration with local governments. In addition, I will disseminate the lessons learned from Minamata Disease to the world.

I am determined to actively contribute to preparing an international convention aiming at preventing mercury pollution so that health damage and environmental destruction such as that caused by Minamata Disease will never be repeated in any other country. To this end, Japan would like to host the second session of the Intergovernmental Negotiating Committee to prepare a global legally binding instrument on mercury which will be held in January next year. Moreover, I would like to name the convention the "Minamata Convention" by hosing the Conference of Plenipotentiaries in Japan, which will be held in 2013 to adopt and sign the convention, and pledge to the world our actions to prevent mercury pollution.

What is really important is to try to ensure that the tragic experiences of Minamata Disease is not repeated.

Representing the government, I hereby pledge that we will do everything we can to achieve a pollution-free and sustainable society in which the lives of people are protected hand-in-hand with local governments, private enterprises and the people of Japan and also to preserve a richly blessed natural environment to pass on to the next generations.

Finally, I would like to give my heartfelt prayers for those who have lost their lives as victims of Minamata Disease.

May 1, 2010
Yukio Hatoyama
Prime Minister of Japan

Lessons from Minamata Disease and Mercury Management in Japan

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Edited and published by Environmental Health and Safety Division
Environmental Health Department
Ministry of the Environment, Japan
1-2-2 Kasumigaseki, Chiyoda-ku, Tokyo 100-8975, Japan
Tel: +81(0)3-5521-8260
Fax: +81(0)3-3580-3596
Email: ehs@env.go.jp