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NEWSLETTER

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THE JAPAN SOCIETY OF WASTE MANAGEMENT EXPERTS

Dear Waste Management Experts

The recent Japanese Diet, or the national assembly, was extremely successful in the legislation of various laws concerned with recycling and waste management. These include the new enactment of the Closed Loop Society Law, the Construction Material Recycling Law, the Food Waste Recycling Law, the Green Procurement Promotion Law, and the amendment of the existing Waste Management Law, the existing Recycling Law and the existing Johkasou Law.

These legislation affect all aspects of our daily existence and socioeconomic activities. Our Newsletter will be introducing these laws one by one in our forthcoming issues, while this issue features the most important, the Closed Loop Society Law. This issue also introduces the present situation of construction/demolition waste in Japan, which was the basis of the new enactment above-mentioned.

JSWME will hold its 11th research conference in Sapporo from November 8-10, 2000. The conduct of the International Session is also planned at the time of the conference. We welcome your active participation.

Under the new leadership of Prof. Masaru Tanaka, the New President of JSWME, and Prof. Isamu Yokota, the Chairman of the International Relations Committee, the Newsletter will further strive to be an information crossroads for waste management experts in and out of Japan.

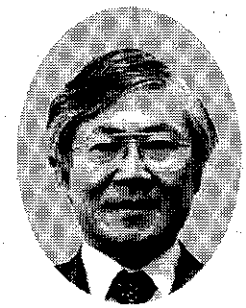
(Hiroki Hashizume)

Indeed this becomes necessary after all.....

Note : We are made to by even waste.....

By courtesy of Prof. Hiroshi Takatsuki (Taka-tsuki literally means "High Moon".)
(translated by JSWME, taken from Monthly "The Waste", May '00)

Greetings from JSWME's New President, Dr. Masaru Tanaka, Prof., Faculty of Env. Science and Tech., Okayama Univ.



It is a great honor for me to have been elected as the sixth president of JSWME.

Since JSWME started with 997 members 10 years ago, it has achieved significant results by expanding its activities, for example, by increasing its members to 3,834 as of 31st March 2000, through the publication of the journal of JSWME, the English newsletter and the Japanese newsletter, and by increasing its presenters to 1,500 in the annual research conference and many symposiums.

Nonetheless, there are still numerous issues that have to be tackled over the next decade. Therefore, I am resolved to endeavor to keep our original aims, that is to make JSWME serve as a means that would facilitate information exchange, continue researches to solve waste problems, and promote social acceptance of the results of our research work.

At present, great expectations are held regarding waste related issues, and these expectations are changing the social structure. From a society that greatly underscored growth in GNP, the target now is to create a society that gives priority to less waste generation, less resource consumption, and less adverse environmental impacts. To cope with the changes, the law for the promotion of a closed loop society and several laws to promote recycling have been recently established. With the concerted efforts of relevant people, the enactment of these laws have produced favorable results, such as ceased growth of the waste generation amount, better recycling rates, and reduced final disposal amount. The packaging waste recycling law stipulates the producers' responsibility, which is further extended by the home appliances recycling law along with the recycling route. Things are definitely improving.

However, people are still very wary as there are still a number of serious and life-threatening problems related to waste, such as: (1) the matter of exporting infectious waste to Manila, (2) the management of huge amounts of

hazardous waste illegally dumped in Teshima, (3) strong opposition from the public with regard to incineration even when dioxin emissions are reduced, (3) lower recycling rates, (4) absence of solutions for PCB treatment in the 20th century, (5) unreliability of the safety of disposal sites. There are many waste related problems that need to be solved before we can handle and treat waste properly. Consequently, I would like to utilize scientific data and insight obtained from studies and research carried out by the JSWME members to work toward solving these problems.

From 2001, the administration for solid waste management will be placed under the new Ministry of Environment. Aiming for efficiency, all sectors in Japan are restructuring, and this includes solid waste management as well.

JSWME, which is in its 10th year, should technologically and scientifically support the promotion of solid waste management policies by making use of scientific data and proper actual solid waste management, excluding any activity that would prove nonsensical or futile. Since the society expects a lot from JSWME, the operation of JSWME will be the cynosure of the public eye.

To strengthen JSWME's activities, therefore, we will aim to consolidate our finances by increasing our members, and then to successfully implement the PBC (Pacific Basin Conference on Hazardous Waste) conference in the fall of 2001.

I will do my best to bring prosperity to the JSWME in cooperation with the members.

Present Countermeasures for Construction Waste in Japan

The construction industry occupies 46% of the total amount of resources consumed by all industries in Japan. Of the industrial waste generation and landfill amount, construction waste occupies 21% and 44%, respectively. In addition, construction waste is also said to make up 87% of the total amount of illegally dumped waste.

Construction waste is categorized into: waste generated by civil engineering work and waste generated by building work. The former occupies 63% of the total construction waste amount, and the latter 37%. As for recycling trends, both types of construction waste have different recycling rates: 68% for the former and 42% for the latter in 1995. Further, 60-70% of the waste from building work is made up of debris from the demolition of a building, and wood chips resulting from the demolition of houses particularly make up a high ratio of the illegally dumped construction waste.

Table: Present Situation of Construction Industry in terms of Resources and Waste (April 1993 to March 1994)

Unit: million tons

	Overall Industrial Waste	Construct -ion Waste	Ratio
Resources consumed	2,400	1,100	46%
Waste amount			
Generation amount	400	82	21%
Recycled amount	310	45	15%
Landfill amount	84	37	44%
Illegally dumped amount	0.39	0.34	87%

Note: The illegally dumped amount is the average of figures from 1993 till 1995.

Source: Ministry of Construction, Environment Agency, Ministry of Health and Welfare

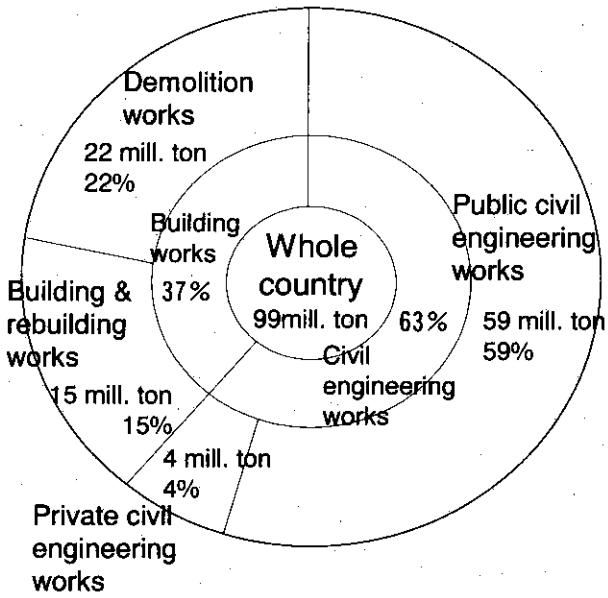


Figure: Generation Amount of Construction Waste (F.Y.1995)

Source: Ministry of Construction

The recycling rate of waste from civil engineering work is high due in part to the initiative of the public sector in recycling concrete and asphalt/concrete generated by civil engineering work (mostly public works). On the other hand, the recycling rate of waste from building work is low due to: 1) clients', mostly private entities, disinclination to pay for the additional cost required to recycle building waste, and 2) containing various types of materials in the demolition waste of buildings/houses.

The Solid Waste Management Law was amended in 1997 resulting in the strict enforcement of regulations, e.g. strictly imposing the disposal of plasterboards in controlled landfill sites. This, however, aggravated existing problems regarding the lack of disposal sites. The necessity for wood chip recycling has also intensified as the regulations relevant to the law for Special Measures for Dioxins (1999) are rigidly enforced.

Six bills and amended proposals for the establishment of a *closed loop society* have just passed the Diet and are being put into effect. Among these is the Construction Material Recycling Law, which stipulates the policies for source

separation, demolition, and resource-recycling of special construction materials such as concrete, asphalt-concrete and wood chips. This law obliges the separate demolition of special construction materials resulting from demolition and new construction works that exceed a certain criteria, as well as obliges demolition companies to register.

In the future, measures to improve the recycling rate of construction waste, including countermeasures at the design stage, will be a focus of concern, in order to lengthen the life span of buildings and to make demolition work and recycling easy to realize.

(Ryoko Sugiyama)

Law to Promote a Closed Loop Society

Introduction

For the recycling of wastes, legal preparations such as the amendment of the Waste Management Law, the establishment of new recycling laws, etc., have been made. However, further measures are urgently required due to the seriousness of the following problems.

1) Huge waste generation amount

   The annual municipal and industrial waste generation amounts respectively total around 50 million tons and 400 million tons.

2) Stagnancy in recycling

   The recycling rates for municipal and industrial waste in 1996 were about 10% and 42% respectively.

3) Difficulty in the acquisition of land for waste management facilities

   The overall life span of the landfill sites for municipal waste and industrial waste in 1996 was 8.8 years and 3.1 years respectively.

4) Sharp increase in illegal dumping

   The number of illegal dumping cases increased from the year 1993 to 1998 by 4.6 times.

In order to solve these problems, the urgent implementation of measures is required to control mass production/consumption/disposal. To mitigate adverse environmental impacts, natural resource consumption will be minimized by promoting recycling in the material production, distribution, consumption and disposal stages.

Based on this premise, the law for the promotion of a closed loop society was established, as a basic legal frame, to build a solid foundation that would widely ensure the actions for recycling according to the plan, and strengthen these actions along with other related legislation.

Consequently, the law for the promotion of a closed loop society was established and enforced in June 2000, and is outlined hereafter, except for item 5 which will be enforced in January 2001.

Outline of the Law for the Promotion of a Closed Loop Society

1. Clearly identifies "a closed loop society".

   A closed loop society refers to a society able to minimize the consumption of natural resources and mitigate adverse environmental impacts by: 1) reducing waste generation amount, 2) using recycled materials, and 3) ensuring appropriate disposal.

2. Identifies valuable wastes, that is subject to this law, as recyclable resources

   The law deals with "wastes", whether valuable or non-valuable, and regards the former as "recyclable resources" and promotes their reutilization.

3. Legalizes, for the first time, the priority ranking of treatment methods
   1) Waste generation control
   2) Re-use
   3) Recycling
   4) Heat recovery
   5) Appropriate disposal

4. Clearly stipulates the responsibilities of the central and local governments, business entities and citizens.

   In order to integrate the actions of the central and local governments, business entities and citizens toward the creation of a closed loop society, the law clearly stipulates their responsibilities. In particular, the law clearly points out the following:
   1) The responsibilities of business entities and citizens as waste dischargers
   2) Establishment of the basic principle for the "Extended Responsibilities of Producers", whereby the producer shall bear certain responsibility for his products from production all the way through utilization until they become waste.

5. Obliges the National Government to formulate a basic promotion plan for the creation of a closed loop society.

   The national government will formulate the basic promotion plan to comprehensively and systematically proceed with the creation of a closed loop society, according to the following.
   1) The Minister of Environment prepares the draft plan in line with the guidelines described by the Central Environment Council.
   2) The Minister of Environment listens to the opinion of the Central Environment Council concerning the establishment of the plan.
   3) The plan shall be approved by the cabinet through discussions with the relevant ministries, in order to ensure the integrated action of the central government.
   4) After gaining the approval of the cabinet, the

plan shall be reported to the Diet.

5) Clear identification of the term for the establishment of the plan and review of the plan every 5 years.

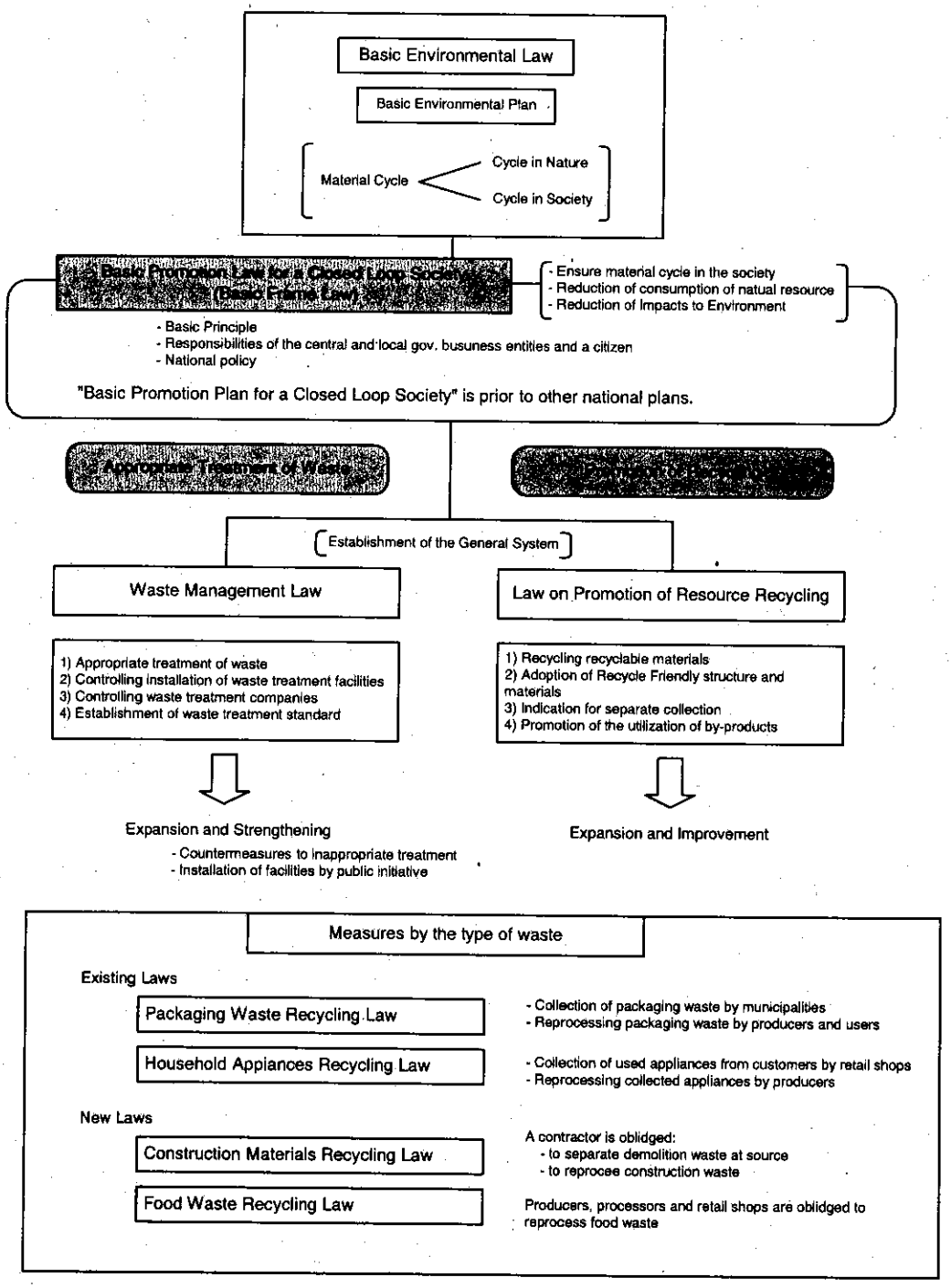
6) The plan for the promotion of a closed loop society shall take precedence over other national plans.

6. Obliges the national government to specify the national measures to promote a closed loop society

- Measures to reduce waste generation amount
- Measures such as regulations to enforce Dischargers' Responsibility
- Measures based on the Extended Producers' Responsibility (Execution of collection of used products, recyclables, and pre-assessment of products)
- Measures to promote the usage of recycled goods
- Measures to force responsible dischargers to bear the cost for environmental recovery.

(Hiroki Hashizume)

Legal System for the Promotion of a Closed Loop Society



Laboratory of Environmental Sanitary Engineering, Department of Architectural Environmental Engineering, Kanto Gakuin University

The research activities of the Laboratory of Environmental Sanitary Engineering in Kanto Gakuin University are classified into three categories; 1) analysis of the behavior of chemical substances during waste disposal, 2) fate assessment of chemical substances in the environment, and 3) development of new and simple methods for the measurement of chemical pollutants in the indoor and outdoor environment. Every study deals with synthetic chemical pollutants that are potentially harmful to man and the ecosystems.

The laboratory is currently doing research for the following studies: 1) Study on the formation of dioxins and related organohalogen compounds in fly ash samples derived from incineration and gasification-melting processes; 2) Basic study on the adsorbability of activated carbon and coke adsorbents for advanced flue gas treatment; 3) Development of a new alternative index for dioxins and related organohalogen compounds in flue gas; 4) Bioremediation of xenobiotic compounds using white rot fungus (*Phanerochaete chrysosporium*); 5) Evaluation of garbage disposal equipment based on biological principles; 6) Application of supercritical fluid extraction and pressurized solvent extraction techniques for the rapid and selective extraction of environmental pollutants; 7) Environmental reaction assessment and modeling of hazardous organic compounds; 8) Effect of soil adsorption on the biodegradability of organic compounds; 9) Development of a passive measurement method for volatile organic compounds in indoor and ambient air; 10) Detection and control of *Legionella* species in plumbing and 24 hours home bath system.

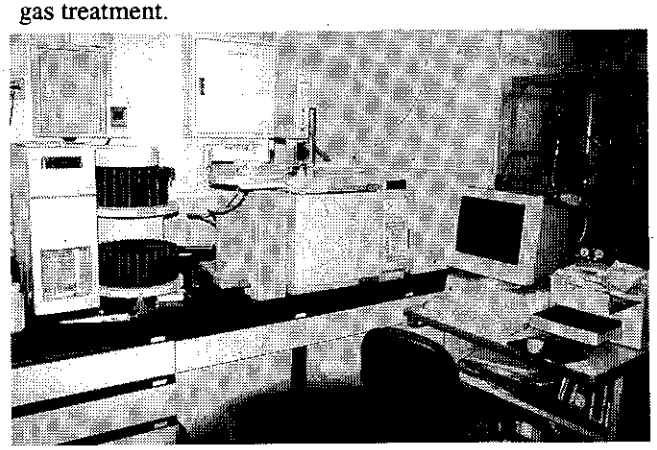
Of the above, studies 1) to 6) closely relate to waste disposal and management. The outlines of these studies are given below.

The formation characteristics of dioxins and related organohalogen compounds from fly ash samples

The formation behavior of PCDDs/DFs and Co-PCBs in fly ash derived from a gasification-melting process is investigated in order to examine their formation potential. Ash samples are placed in a laboratory scale heating apparatus while gas is flowing. Figure 1 shows the apparatus and analytical equipment for gas chromatography - quadruple mass spectrometer and pressurized solvent extraction. The analytical equipment enable the determination of various pollutants in mixed environmental matrices. Experimental runs are done to investigate the effects of important parameters on the formation, including the type and composition of ash or other solid samples, temperature, gas residence time and organic precursors. The apparatus may be utilized in an experimental system not only for chemical reactions such as dioxin formation but for the desorbing nature of volatile compounds in solid samples.

Basic study on adsorbability of activated carbon and coke adsorbents

The study is conducted in order to determine the adsorption amount of activated carbon and activated coke adsorbents with due consideration of the influence of the adsorbent property for application in an advanced flue gas treatment system. A laboratory scale stationary bed reactor is utilized to measure gaseous breakthrough curves of surrogate compounds of dioxins, e.g. chlorobenzene, under various conditions. The results show a distinct feature in the adsorbability of adsorbents. Extensive study is expected to further investigate useful materials for flue gas treatment.



Laboratory Equipment

Left: Pressurized solvent extraction equipment for the rapid and efficient extraction of pollutants from solid samples

Middle: Gas chromatograph-quadrupole mass spectrometer system for the determination of trace organic pollutants

Right: An electric furnace system of the experiment for dioxins formation in heated ash and solid samples

Development of a new alternative index for dioxin and related organohalogen compounds in flue gas

The monitoring of dioxins has been problematic due to the high cost and time consuming nature of the work. Therefore, a more cost and time-efficient measurement technique is strongly needed.

Alternative flue gas indices such as chlorobenzenes and/or chlorophenols were already proposed. A new index for dioxins in flue gas, that is TOX (Total organic halogen), is further developed, enabling rapid, easy and safe measurement. Organohalogen compounds can be determined as total halogenated organic compounds. However, organochlorines or organobromines can also be determined in a separate group by using a separate analysis method. This may contribute to the development of an independent measurement of chlorinated and brominated compounds.

Bioremediation of xenobiotic compounds using white rot fungi (*Phanerochiate crysosporium*)

There is a huge possibility that *Phanerochaete chrysosporium* can degrade many kinds of xenobiotic compounds by the activities of its enzymes, e.g. lignin peroxidase. The fungus is a species that finds culturing in

an environment for bioremediation somewhat difficult. Based on scientific knowledge obtained from batch experiments, a reactor system where the fungi can work well is being constructed, in order to remedy persistent xenobiotics in solid and liquid wastes. As high enzyme activity is currently obtained in the continuous reactor, the *Phanerochaete chrysosporium* reactor is expected to attain a highly efficient degradation of the compounds.

The laboratory collaborates with several laboratories in MIT (USA) and in Trent University (Canada) for the conduct of studies on the assessment of the environmental fate of chemicals. If you have interests in the studies of our laboratory, please contact us.

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Journal of Material Cycles and Waste Management, Vol. 2, No. 1 (2000)

Recent issue of the Journal of Material Cycles and Waste Management contains the following articles. The articles are written in English.

REVIEW ARTICLE

Material cycle, waste disposal, and recycling in a Leontief-Sraffa-von Neumann economy
E. Hosoda

ORIGINAL ARTICLES

Chlorine promotes antimony volatilization in municipal waste incineration
N. Watanabe, S. Inoue, H. Ito

Investigation of hydrogen generation from municipal solid waste incineration fly ash
S. Mizutani, S. Sakai, H. Takatsuki

Ethanol washing of PAH-contaminated soil and Fenton oxidation of washing solution
B.-D. Lee, M. Hosomi

Predicting the degradation pattern of organic materials in the composting of a fed-batch operation as inferred from the results of a batch operation
K. Nakasaki, N. Akakura, M. Takemoto

Genotoxicity of substances extracted from construction materials
Y. Ono, H. Uemura, Y. Kanjo, O. Kawara, T. Ayano

Acidic bioleaching of heavy metals from sewage sludge
A. Shanableh, P. Glnige

Determination of nitrous oxide, methane, and ammonia emissions from a swine waste composting process
T. Osada, K. Kuroda, M. Yonaga

NOTE

Feasibility investigation on a dual waste-plastics recycling system concept
S. Hayashi, K. Nomaguchi, T. Okusawa, O. Yokomizo, Y. Ishigaki, H. Ishimaru

Journal of the Japan Society of Waste Management Experts, Vol. 11, No.3 (May 2000)

Recent issues of the Journal of JSWME contain the following articles. The articles are written in Japanese with the abstract in English.

Paper

Hydraulically and Mechanically Stabilized Slag (HMS) using Slag, Coal Ash and Construction Sludge
Kohji Kakimoto, Yasuko Nakano, Hiroaki Ogawa, Yoshito Shirai and Yasuhiko Kato

Estrogenic Cell Growth Activity and Genotoxicity of Fly and Bottom Ashes and Leachate
Yoshiro Ono, Saeko Kanoh, Kentaro Aoi, Masato Yamada, Tsutomu Imaoka and Osami Kawara

DC Electric Joule-Heating System for Melting Ash Produced in Municipal Waste incinerators
Junya Nishino, Jujiro Umeda, Toshiyuki Suzuki, Ken-ichi Tahara, Yoshiaki Matsuzawa, Shun-ichiro Ueno and Naohito Yoshinari

Developments of Cadmium Removal Systems for Residues Wasted from Scallop Processing Manufacture by an Electrochemical Method
Youichi Sakuta, Nobuhiro Nagano, Keiichi Tomita, Motoomi Wakasugi, Takayuki Saitoh, Kazuyoshi Shimakage and Toshimori Kitazaki

Efficient Sampling Method of Dioxins in Flue Gas
Mika Kato and Kohei Urano

Current Members of JSWME	As of 31 May 2000 (value in parenthesis is the difference from 1 April 2000)
Regular Members	3,358 (59)
Students	193 (-3)
Non-Japanese Members	19 (1)
Public Institutions	110 (0)
Supporting Members	206 (-5)
Total	3,886 (52)

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