JSWME
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NEWSLETTER

No.32 *This Newsletter is a quarterly publication using recycled paper.* April 2000

THE JAPAN SOCIETY OF WASTE MANAGEMENT EXPERTS

Dear Waste Management Experts

2000 is believed to be a year of significant changes in waste management and recycling in Japan. The new Dioxins Control Law has been in effect since January, the Packaging Waste Recycling Law is fully implemented in April, and the government is currently trying to simultaneously enact 3 new laws and amend 2 existing laws on waste management and recycling. The three new laws are the Recycling Orientated Society Law, the Construction/Demolition Waste Recycling Law, the Food Waste Recycling Law. The two existing laws are the Waste Management Law and the Recycling Law. How the debate on these laws are carried out in the National Diet is not very clear at this moment. Anyway, we will cover the issue in our NEWSLETTER in the near future.

In Japan, municipalities are given a subsidy when they build such facilities as incinerators, bulky waste crushers, etc. (see JSWME NEWSLETTER #29, July '99). In fiscal 1999, the guideline for the facilities to be subsidized was amended into performance-based standards rather than structure-based ones. This NEWSLETTER provides the readers with some insights into the new guideline which may lead to a change in the relationship between the standards and technological development.

From November 8-10, 2000, JSWME is going to hold its 11th Research Conference in Sapporo. As usual, the conference will hold an International Session. We welcome your active participation.

(Hiroki Hashizume)

Establishment of the Environmental Standards for Dioxins

According to the Law for Special Measures for Dioxins established in June '99, which was introduced in the Newsletter No.30, the Japanese Government enacted various new standards on 15 January 2000. These standards include environmental quality standards, gas emission standards, etc. The enactment confirm the establishment of a legislation system to systematically cope with dioxins. This article introduces the outline of the new values and concepts for the establishment of the new standard.

1) Tolerable Daily Intake (TDI) Value

Based on an ordinance, the TDI was set at 4 picograms or less per 1kg of body weight for humans. (TDI means the allowable daily maximum amount of dioxins man continuously takes in for a whole life period and is expressed as 2, 3, 7, 8-tetrachlorinated dibenzo-p-dioxin (TEQ: toxic equivalents).)

2) Environmental Quality Standards

Ambient Air : 0.6 picograms per cubic meter
Water : 1 picograms per liter
Soil : 1000 picograms per gram

3) Standards for Gas Emission and Water Discharge

Exhaust gas standards for incinerators:

① Existing standards apply to plants with an incineration capacity of 200 kg per hour.

② The new standards will be applied to plants with a smaller incineration capacity, i.e. 50 kilograms per hour.

Standards for newly built plants:

Varies from 0.1 to 5 nanograms (TEQ) per cubic meter depending on plant capacity

Standards for existing plants:

80 nanograms (TEQ) per cubic meter till the end of November 2002, after which they vary from 1 to 10 nanograms (TEQ) per cubic meter depending on plant capacity.

Effluent water quality standards for incinerators:

10 picograms (TEQ) per liter; provisionally 20 to 50 nanograms (TEQ) per liter.

4) Treatment of Fly Ash and Bottom Ash From Waste Incineration

Less than 3 nanograms (TEQ) per gram

5) Operation and Maintenance of Final Disposal

The effluent water quality standard is applied for effluents.

6) Prevention Measures for Scattering and Spillage of Dust

Prevention measures shall be taken in the following cases.

① Scattering of dust during landfill operation

② Scattering and spillage of dust from the surface of landfill after daily landfill operation

③ Scattering and spillage of dust from incoming vehicles

7) Measures to Prevent Pollution of Public Water Bodies by Effluent from Final Disposal Sites

Dioxin concentration in leachate becomes higher with the increase in the percentage of dust and ash in the landfilled

waste. Also, if the landfill waste contains dust and materials, e.g. oil, with surface active function, dioxins in the dust may leach. These waste types, therefore, should not be landfilled where they could get into contact with dust.

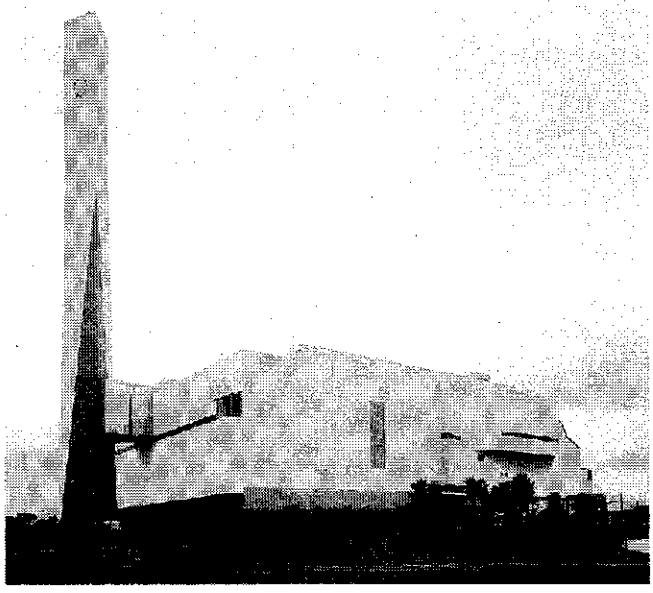
8) Landfilling Methods for Wastes Containing Dioxins

The final disposal method for waste containing more than the standard amount specified for dust treatment, etc., will be decided in reference to the final disposal method for dust.

The final disposal method for debris of inner lining materials of furnaces and the concrete debris of stacks generated when incineration plants are demolished, shall be in compliance with the standard in view of the possibility that dust containing dioxins may adhere to these materials.

9) Measures to Ensure Final Disposal Site Operation and Maintenance

A manual for final disposal site operation and maintenance, including measurement and data recording methods, as well as the items these shall cover, shall be prepared. A manual for disaster management shall be prepared as well.



New Incineration Plant (capacity: 600 t/24h x 3 lines) in Koto, Tokyo.
An incineration plant recently constructed meets the most stringent emission standard (0.1 pgTEQ/m^3).

(Hiroki Hashizume)

"New Performance Standards for Waste Treatment Facilities"

The Design Manual for Waste Treatment Facilities

The 1992 Earth Summit in Rio de Janeiro focused on the "Sustainable Development of the Earth", with energy conservation, rapid population growth control and environmental conservation as key agendas. In line with these, the Japanese government revamped its environmental legislation system by amending the Waste Management Law and establishing the Packaging Waste Recycling Law in 1995, establishing the Law on the Recycling of Household Appliances, revising the Waste Management Law and Air Pollution Control Law for dioxins in 1998, and by establishing the Private Finance Initiative Law in 1999. These changes are geared toward the strengthening of environmental pollution control and material recycling measures, deregulation of the licensing and approval system, private sector participation in public sector services, and the development of technology associated with these measures.

In the field of solid waste management, new technologies and new products such as refuse derived fuel (RDF), ash melting furnace, dioxin treatment methods, gasification furnace, etc. started to appear in the market sometime in 1994. Waste management and treatment entities, e.g. municipal governments, have been in need of materials that would help ensure objective technical judgement for the selection of relevant technology. In addition, the formulation of a technical guideline applicable not only to the existing technologies in Japan but also to the entry of new enterprises, including foreign enterprises, was required.

In order to cope with these demands, the Ministry of Health and Welfare enforced "the Guidelines for the Performance of Waste Treatment Facilities" in April 1999 after repealing "the Guidelines for the Structure of Waste Treatment Facilities" in October 1998. The latter was the criteria established to determine eligibility for national subsidy for the improvement of solid waste processing and treatment facilities. In order to support the new guideline, "The Plan and Design Manual for Waste Treatment Facilities" was jointly prepared by universities, local governments, consultants and manufacturers, and published by the Japan Waste Management Association and the Japan Waste Research Foundation in August 1999.

Regarding solid waste processing and treatment facilities, the minimum requirements for facility structure, operation and maintenance have been specified in compliance with the Waste Management Law. Since improving the

efficiency of solid waste processing and treatment is strongly required through the effective use of the financial source and prompt introduction of new technologies, a performance guideline was prepared. The guideline specifies the level of performance required for projects to become eligible for central government subsidy, the verification system and items specified by relevant laws.

The performance guideline was made for waste incineration plants, ash melting furnace plants, crushing and sorting plants, RDF plants, and rapid waste composting plants. The requirements for a waste incineration plant in terms of performance are as follows.

(Note: A waste incineration plant refers to a plant oxidizing waste at high temperature to reduce waste volume and convert it to ash or slag. It includes incineration plants consisting of stoker type incinerator, fluidized bed incinerator, rotating type incinerator and also gasification type incineration plant.)

1) Waste Incineration Capacity

To have the capacity to convert waste into ash or slag by incineration, according to the target quality and quantity.

2) Properties of Residual Ash

Ignition loss in residual ash excluding fly ash is to be less than 5% in a continuous type incinerator and less than 7% in a semi-continuous type incinerator.

3) Stable Operation

The operation of a continuous type incinerator should be continuously and steadily done for more than 90 days per line. The operation of a semi-continuous type incinerator should be continuously and steadily done in the planned working days for more than 90 days per line.

4) Utilization of Surplus Energy

The continuous type incinerator is required to enable power generation, supply of heat and the utilization of other types of surplus energy.

The performance guideline requires the plant to comply with the above requirements and relevant laws and regulations, e.g. Waste Management Law, Air Pollution Control Law, Water Pollution Control Law, etc., and the requirements of the Guideline for Dioxins instead of laying particular specifications for the structure. The introduction of this system is also expected to encourage the development of new technologies.

In order to ensure that the performance guideline is adopted properly, the suitability of the technology in terms of capacity should be verified. Therefore, test plants or operating plants should show their operation records to determine whether they meet the required capacity.

Consequently, it will demand the staff of local governments to fully understand the rapidly advancing waste treatment technologies, relevant laws and regulations and technical evaluation criteria, in order to improve the facilities smoothly. This will eventually give them the skills to properly decide as to what new technology to adopt.

(Kenji Kakeda, Hiroki Hashizume)

Incineration of Municipal Solid Waste in Japan (2)

- Changes in the Laws, Regulations and Environmental Control Measures for Incinerators -

In Japan, the legislation for the treatment of municipal waste has been arranged with the aim to improve public hygiene. In large cities where lands suitable for landfill development are scarce, incinerators were introduced early on to rapidly neutralize huge amount of waste.

1. Changes in the Laws for Waste Management and Incinerators for Municipal Waste

The first legal restriction for municipal waste was enacted in the Edo era, but the first law, "Dirt Cleansing Law", after Japan's modernization was enacted in 1900. This law stipulates the incineration of municipal waste. Public Cleansing Law was enacted after World War II (1954) to improve public hygiene. Being the first comprehensive law on waste management, this law stipulates the responsibilities for waste management, the licensing system for waste management enterprises and waste management facilities, etc. The Waste Management and Public Cleansing Law now in force was enacted based on the aforementioned Public Cleansing Law in 1970 together with the Air Pollution Control Law. These laws have undergone several major amendments since then.

The Waste Management Law stipulates the following for the installation of an incineration plant for the treatment of non-industrial waste: 1) a notification to the prefectural governor is required if the installation is by a local government, 2) approval by the governor is required if installation is by a private enterprise, 3) compliance with the technical standards of the Ministry of Health and Welfare. The law also obliges private entities to employ legally qualified individuals for the proper operation of an incineration plant. As for exhaust and effluent from incineration plants, the Air Pollution Control Law and Water Pollution Control Law apply. Dioxins are regulated by the Law for Special Measures for Dioxins Control enforced in January 2000.

2. History of the Introduction of Incineration Plant for Municipal Waste

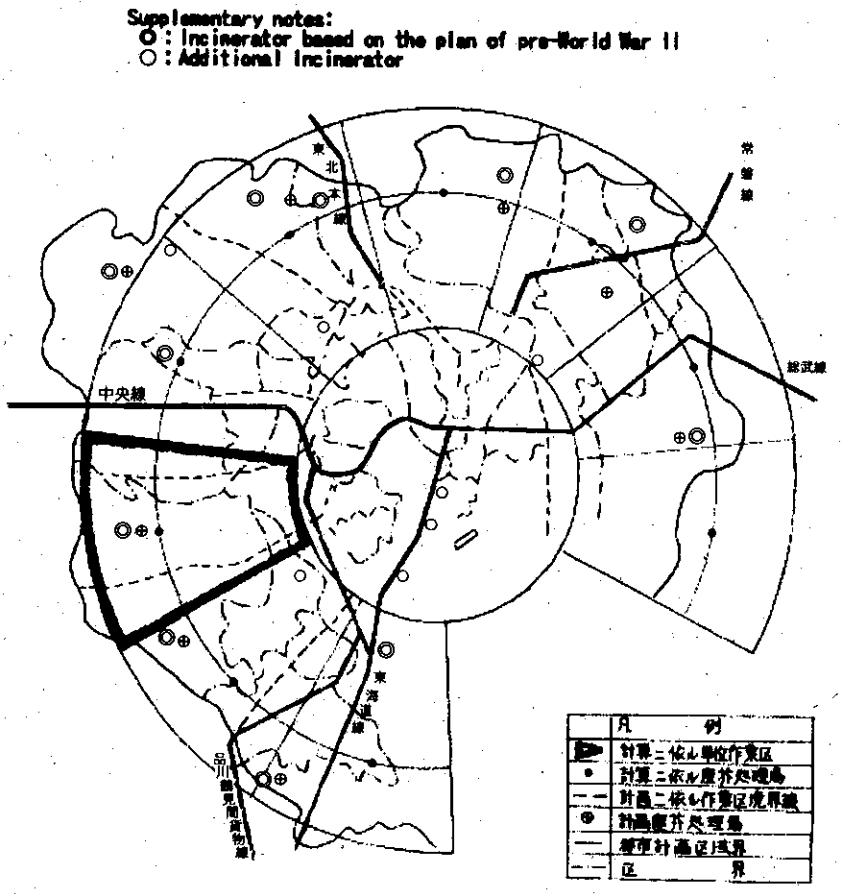
It is said that the first incineration plant in Japan was introduced in 1897 in Tsuruga city, Fukui Prefecture. With economic growth, the number of incineration plants rapidly increased from the 1920s. Most of the incineration plants constructed before 1970 were fixed grate batch type incinerators.

In Tokyo, the construction of incineration plants with a 20 to 30 ton capacity started around 1924. In 1932, the Fukagawa incineration plant was constructed with an incineration capacity, 940 ton per day, that can accommodate the total amount of waste generated in the urban area of Tokyo. With the expansion of the urban area, the Tokyo Metropolitan Government formulated a plan to construct 9 incineration plants along Loop 8 in 1939. The plan was not implemented, however, until after World War II. Having a life span of 15 to 20 years, most

fixed grate batch type incinerators constructed in this period had been replaced with the modern continuous type incineration plants equipped with various environmental protection systems, surplus heat utilization system and power generation system.

To this day, incineration plants for municipal waste are being improved and new technologies, e.g. ash melting furnace system, gasification type furnace system, etc., are being introduced, in accordance with strengthened environmental control regulations and review of the demand for new energy.

戦前に作られた東京都特別区の焼却場計画図



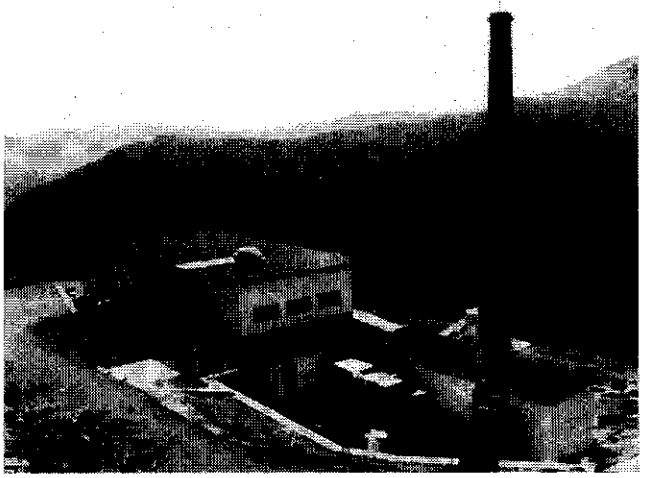
Location Map of Proposed Incineration Plants in the Special Wards of Tokyo based on the Pre-World War II Plan

3. Changes in Measures to Mitigate Pollution Caused by Incineration Plants

Steady incineration is technically difficult to attain due to inconsistencies in waste composition. As previously mentioned, fixed grate batch type incinerators were the most commonly used in the early years. This incinerator type was used for waste with a calorific value of around 1,000 kcal per kilogram. At this time, authorities were not able to prevent the dust and odour generated by incomplete waste combustion using this incinerator type from polluting the environment. Owing to technical advancements and a higher waste calorific value (over 2,000kcal/kilogram), however, waste can now be fully incinerated without the aid of auxiliary fuel.

In addition to the various environmental control laws and regulations that influence municipal waste incineration plant operation, local governments and agreements concluded by residents in areas where these plants are located also enforce ordinances that require higher operation standards. The items subject to these laws and

regulations and the required standard have been strengthened step by step. For gas emission, the first items that were regulated were dust and SOx, followed by NaOH and NOx. Recently, a standard for the emission of dioxins was established.



The incineration plant in Oniishi-cho, Gunma-prefecture (capacity: 12 ton/day)
Small incinerators are actively used in local towns.

Changes in countermeasures against gas emission include the replacement of the scrubbing dust collector often used for the fixed grated batch type incinerator with the electric precipitator. The height of the smokestack has also increased, often more than 150 meters, in accordance with higher standards for dust emission. As for measures to control HCl, wet and dry type methods are adopted. For NOx, the combustion control method and the deoxidization method using a catalyst have been adopted. For dioxin emission, the countermeasures adopted are: combustion at high temperature to reduce dioxin generation amount, improved cooling system for gas emission, better furnace design. For the removal of dioxin, fiber filters and the de-NOx catalyzer were adopted.

Fly ash contains high levels of heavy metal and dioxins. In 1992, fly ash was categorised as one of the Specially Controlled Wastes (hazardous waste) and the solidification of this material with cement was deemed necessary. The ash melting technology used for the reduction of bottom ash volume is also effective in reducing dioxin generation amount. So far, various technologies, e.g. ash treatment, effluent treatment, have been developed to counter-act environmental pollution.

(Hideo Azuma)

Universities and Research Institutes Concerned with Waste Management in Japan (6)
Japan Waste Research Foundation

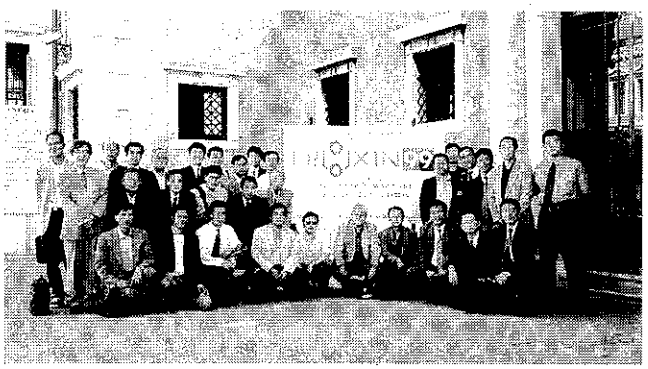
Japan Waste Research Foundation (JWRF) is a non-profit research center established in 1989 under the authorization of the Ministry of Health and Welfare to promote cooperative waste management research and development.

JWRF conducts waste management research and technological development upon the request of the national government, municipalities, etc. It organizes special research committees to effectively carry out these requests. The results of JWRF's research activities are widely utilized for the formulation of state measures and norms as well as for the proper implementation of municipal waste management practices.

Recent works carried out by JWRF focused on the following:

- Micro-pollutant control at waste landfill sites
- Behavior and control of dioxins and dioxin-like substances during waste treatment/disposal
- Methods for the analysis of hazardous waste
- Rehabilitation of site polluted by waste
- Recycling and reuse system for organic waste
- Control of chemical substances during recycling and disposal

JWRF also offers consultancy services, giving advice on specific new technologies to the private sector upon request, in order to promote the development and extensive use of technology. Recent technologies include municipal waste gasification and pyrolysis, and the treatment of night soil highly mixed with *Johkasou* sludge. JWRF also actively diffuses information on waste management technology by publishing the results of its research activities as well as data books, e.g. Registry on Incinerators in Japan (most of the publications are written in Japanese).



The mission participating the DIOXIN 99 (International Symposium on Halogenated Environmental Organic Pollutants and POPs) in Sep. 1999

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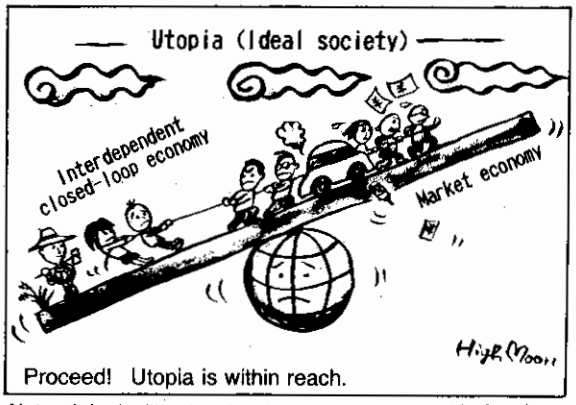

Note : It looks like the situation may be reversed before long.

By courtesy of Prof. Hiroshi Takatsuki (Taka-tsuki literally means "High Moon".)
(translated by JSWME, taken from Monthly "The Waste", Nov. '99)

Note from the author:
It looks like the situation may be reversed before long.

Journal of the Japan Society of Waste Management Experts, Vol. 11, No. 1 (January 2000) and Vol. 11, No.2 (March 2000)

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

<Vol. 11, No.1 (January 2000)>

Paper

An Analysis Considering the Regional Factors of the Effects of User Fees and Sorted Collection for Solid Waste Services on the Reduction of Waste
Toshiaki Sasao

Development of Medium by the Combined Treatment of Steam Explosion and Chemical Decomposition of Peanut Shells for Production of Xylitol by Candida Tropicalis
Changho Cho, Shinobu Aruga, Masahiro Hatsu, Tohru Suzuki, Keiichi Kawai and Kazuhiro Takamizawa

The Construction of a Waste Sorting Collection System in a University – A Case Study in the University of Tokyo –
Shinya Suzuki, Michiko Yokoyama, Arata Ichikawa and Kazuo Yamamoto

Decomposition of Halogenated Volatile Organic Carbon (Tetrachloroethylene) by Photocatalytic Degradation
Naru Fukami, Maina Yosida, Byung-Dae Lee, Kazuo Taku and Masaaki Hosomi

Development of a Diagnostic System for Soil and Groundwater Contamination and its Application to the Inappropriate Storage Sites
Tohru Furuichi, Kazuei Ishii, Yasushi Terao and Kanetoshi Morishita

<Vol.11, No.2 (March 2000)>

Paper

Demonstration Test of Dioxin Suppression Using an Iron Oxide Catalyst at Intermittently-Operated Incinerator for Municipal Solid Waste
Tomoyuki Imai, Yasuhiko Fujii, Toshiki Matsui and Tasuku Nakai

Investigation of Environmental Loading During Building Construction – Estimation of Fixed Resource Consumption and Waste Discharge by Accumulation Method –
Makoto Yamaguchi and Toshiro Ogasawara

Input-Output Analysis of Waste Treatment and Recycling
Shinichiro Nakamura

A Study of Feasibility of Extracting Metals from CCA-treated Woods by Using Supercritical Carbon Dioxide
Yukitoshi Takeshita, Yoshiyuki Sato and Shiro Nishi

Integration of the Process of Site Selection for Landfill Sites through Considering Resident's Participation
Tsugiya Fukumoto, Tohru Furuichi, Kazuei Ishii, Yumiko Ebina and Masataka Hanashima

Current Members of JSWME	As of 28 December 1999 (value in parenthesis is the difference from 1 November 1999)
Regular Members	3,431 (11)
Students	220 (0)
Non-Japanese Members	26 (0)
Public Institutions	114 (0)
Supporting Members	219 (0)
Total	4,010 (12)

NEWSLETTER NO.32
Published by
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April, 2000