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# NEWSLETTER

**No.34** *This Newsletter is a quarterly publication using recycled paper.* **October 2000**

*THE JAPAN SOCIETY OF WASTE MANAGEMENT EXPERTS*

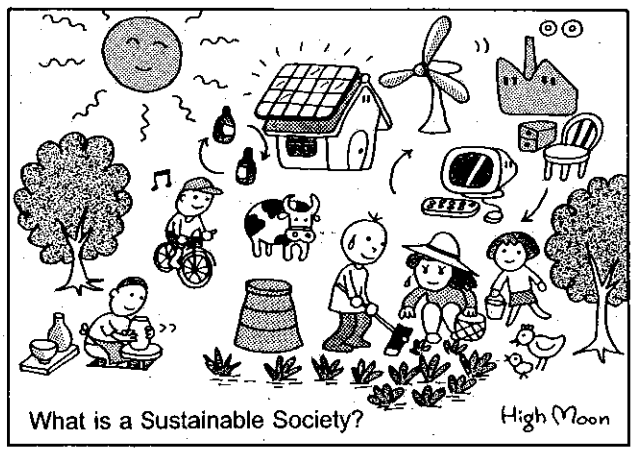
## Dear Waste Management Experts

This issue of the JSWME NEWSLETTER shows the outline of the Food Waste Recycling Law which was enacted this July together with the Closed Loop Society Law (see issue #33) and two new laws and the amendment of three existing laws.

Although most articles in our NEWSLETTER are on solid waste, JSWME does deal with liquid waste and human excreta according to the definition of waste in the Japanese Waste Management Law. Human excreta or night soil is treated in two different ways where public sewerage is not available in Japan. One by biological/physico-chemical treatment after transportation in a specially designed tank car, and the other is treatment of night soil and domestic gray water using a Johkasou. This issue of the NEWSLETTER introduces a challenge, namely, the application of the Johkasou system in Indonesia.

On November 8-10, 2000, JSWME is going to hold its 11th Research Conference at Hokkaido University, Sapporo, and the International Session is planned on the 9th. We welcome your active participation.

(Hiroki Hashizume)




Note : Without a change of life-style, it is unattainable.

By courtesy of Prof. Hiroshi Takatsuki (Taka-tsuki literally means "High Moon".)
(translated by JSWME, taken from Monthly "The Waste", September 2000)

## Establishment of Food Waste Recycling Law

Recycling of waste in Japan has recently been promoted by means of establishment of laws that respectively incorporate concrete measures to encourage recycling of specific type of waste such as packaging waste, home appliances and construction/demolition waste in addition to newspapers and some kinds of glass bottles, which have been recycled for a long time.

- These laws were introduced one after another taking into consideration waste generation amount and feasibilities of separation/recycling techniques.
- Amid those wastes, especially food waste is generated in a great quantity. However, it has not positively been recycled so far, as it is an organic matter that is easy to decompose and give off bad odour.
- In such circumstances, in June 2000, the "Law for the Promotion of Recycling of Food Resources (Food Waste Recycling Law) was established by the Japanese Diet.
- This law is to minimize the amount of final disposal by means of waste prevention and reduction of food waste, and to promote it's recycling by business establishments such as food manufacturing, food distribution and food service, in order to utilize the food waste as materials for feed and fertilizer (The law shall come into force by June 2001).

**Outline of the law**

Establishment of Fundamental Principle: Minister of Agriculture, Forestry and Fisheries, Minister of the Environment and some other ministers establish the Fundamental Principle regarding targets and plans of recycling, prevention and reduction of food waste (hereinafter referred to as "Recycling").

Obligation of the Recycling: Business establishments concerned with food industries shall tackle the Recycling according to its standards set by the ministers.

Recommendations and others by the ministers: In case that the degree of achievement of the Recycling is considerably far from the standards, the ministers are able to recommend, announce publicly and give orders to the business establishments.

With establishing a registration system of business establishments that carry out the production of fertilizer and feed, the Recycling is promoted by consignment.

Table: Present Situation of Generation and Disposal of Food Waste

Unit: thousand ton

| Category | Generation amount | Disposal | | | | |
|---|---|---|---|---|---|---|
| | | Incineration/ landfilling | Recycled | | | |
| | | | Fertilizer | Feed | Others | Total |
| Municipal solid waste<br>-Ordinary business waste<br>-Household waste | 16,000<br>6,000<br>10,000 | 15,950<br>(99.7%) | 50<br>(0.3%) | - | - | 50<br>(0.3%) |
| Industrial waste | 3,400 | 1,770<br>(52%) | 470<br>(14%) | 1,040<br>(31%) | 120<br>(3%) | 1,630<br>(48%) |
| Waste from business establishment* | 9,400 | 7,750<br>(83%) | 490<br>(5%) | 1,040<br>(11%) | 120<br>(1%) | 1,650<br>(17%) |
| Total | 19,400 | 17,720<br>(91%) | 520<br>(3%) | 1,040<br>(5%) | 120<br>(1%) | 1,680<br>(9%) |

* Waste from business establishment = Total – Household waste

*Source: Estimation by Ministry of Health and Welfare, and Ministry of Agriculture, Forestry and Fisheries.

**Expectation towards the system**

Promotion of the Recycling of food waste is a new policy trend, however, there have been success stories as mentioned below. We expect that this new system will firmly be established and achieve a success.

***Case 1: A hotel in the Tokyo Metropolitan Area***

Food waste generated from restaurants, banquet halls and the like is treated at primary treatment facilities using such methods as microbial fermentation. The volume of the waste is reduced to one fifth of the original. Then, it will be brought to farmers, mixed with straws of rice plants and others there, and utilized after being matured.

[Cost comparison]

| | Cost in this case | Charge having been paid to a waste disposal company |
|---|---|---|
| Primary treatment | 20,600 yen/ton | 24,500 yen/ton |
| Transport to farmers | 2,200 yen/ton | |
| Total | 22,800 yen/ton | 24,500 yen/ton |

Note: Exchange rate as of 12 Sep. 2000: US$1=109.00 yen

***Case 2: A convenience chain store***

The chain store commenced the recycling of food waste with the cooperation from intermediate treatment companies in a prefecture and the local government. They contract with a company for collection of bread, box lunches and other food wastes generated from approximately 270 shops in the prefecture. After the waste is turned into compost, it will be supplied to contracted farmers.

[Cost comparison]

(Cost in this case including transport cost)

28,000 yen/month

(Charge having been paid to a waste disposal company)

30,000 yen/month

(Hiroki Hashizume)

**Technology Transfer for Johkasou Utilization in Indonesia**

The Japan International Corporation of Welfare Services (JICWELS), a non profit public organization authorized by the Japanese Ministry of Health and Welfare, carried out the "Survey Project on Night Soil Treatment Technology Transfer" in FY 1994, for three years, under a contract with the ministry. During this period, JICWELS transferred technology regarding the designing, installation and operation of a gappei-shori johkasou, a on-site treatment system for domestic wastewater, in Cirebon, Indonesia, and produced a manual for the introduction of the system based on the experiences gained from the technology transfer activities. Here, "gappei" means combined, "shori" means treatment, "johka" means purification and "sou" means a tank. A survey project was also carried out for another three years (from FY 1997) to promote the transfer of technology for the management of the gappei-shori johkasou, followed by the formulation of the operation manual thereof. The gappei-shori johkasou for combined treatment of night soil and grey water was developed in Japan as an on-site domestic wastewater treatment system. A gappei-shori johkasou of the smallest scale can accommodate wastewater even from one household.

The activities in the first project are briefly introduced.

**Outline of the Project**

The project targets areas that are not likely to have a public sewerage system in the near future and where houses are relatively clustered together. Selection will be based on the following criteria: ① existence of an organization capable of carrying out water quality analysis, ② capability to secure an engineer who could operate and maintain the facilities, ③ likelihood of resident cooperation in facility operation and maintenance.

The specifications of the model plant were set taking the following into account: (1) a plant scale for a residential area or an apartment with 10-20 households (50 to 100 persons) with due consideration of the installation cost and ease in study implementation, (2) proposed target

BOD: 20mg/L and 50mg/L, (3) inexpensive construction cost, ease in material procurement, low electrical consumption, not requiring frequent maintenance, and suitability of facility structure to local technical capabilities.

**Discussions at the Site**

JICWELS visited the PDAM, the public company responsible for water supply, sewage treatment and solid waste management in Cirebon City, the selected target area, for discussions on the project.

Located in the eastern section of West Java, Cirebon is a port city of 37.4km$^2$ with a population of approximately 250 thousand. In 1975, the city started an urban development project with the support of the SDC of Switzerland. At the visited time, the sewerage coverage ratio was 25%, and while 10% of the population was serviced by the two wastewater treatment facilities of a housing corporation, 65% used septic tanks.

PDAM desired to construct a sewage treatment facility in the newly developed middle and high income residential area. Accordingly, it intended to install a gappei-shori johkasou in the new office building under construction for demonstration.

The dischargers consist of about 100 employees and about 50 visitors to the site every day. In addition, wastewater from toilets mostly makes up the majority of the sewage amount. The rest originates from dishwashing, cooking and laundering activities.

Although the construction site and wastewater quality deviated from the original plan, some of the prerequisites have been satisfactorily met, so that JICWELS decided to incorporate these changes in establishing the targets of the project. The model facility targets an effluent BOD level of 20mg/L, the most stringent level set in Indonesia, and will adopt the contact aeration method from the view point of easiness of maintenance (difficulty in obtaining the material for this method, however, is anticipated).

**Installation and Operation of Johkasou**

JICWELS designed a gappei-shori johkasou that adopts the separation - contact aeration process with a pre-screening tank in the sedimentation/separation tank. Made of reinforced concrete, the facility is equipped with some tanks with each required capacity based on the information obtained from a site survey: inflow of 4.3m$^3$/day and 130mg/L for influent BOD. Except for blowers, all materials were locally procured. The construction was carried out by the PDAM although an expert on johkasou technology was dispatched from Japan at the final stage to provide advice and to supervise.

Facility operation commenced on 24 June 1996 and continued amid problems brought about by blower and pump malfunction, suspension of aeration for energy conservation, shortage in disinfectant and inflow pipe blockage due to poor installation. To help cope with these problems, however, instructions and guidance were provided.

Data on operation and maintenance for 2 and a half years indicate that effluent BOD stabilized around 120 days after the operation of the facilities commenced.

**Key Issues to Consider for Project Implementation**

Although there are slight concerns about the fact that the operation of the gappei-shori johkasou is being independently carried out, as for the personnel training, the formulation of the introductory manual and the technology transfer activities, for the most part we are satisfied with the results. The key issues to be considered

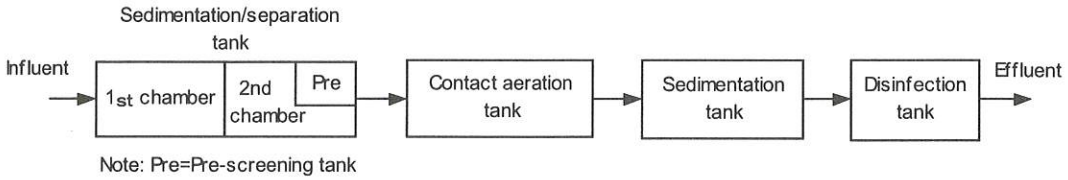



Figure: Flow chart of the Johkasou installed for the PDAM

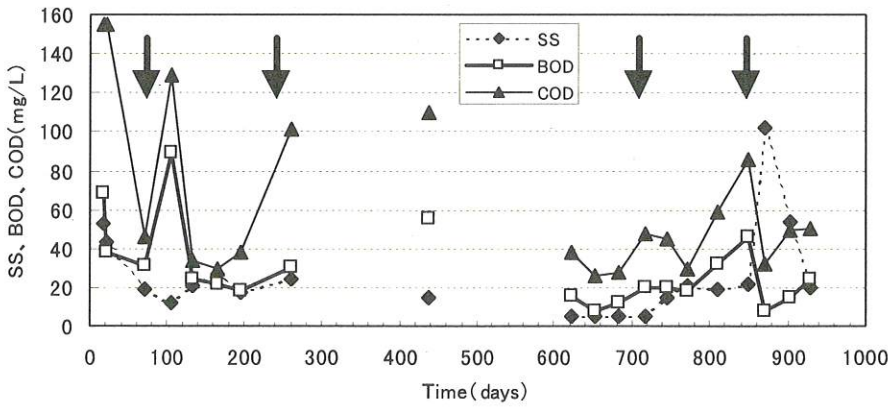



Figure: SS, BOD and COD in the Treated Wastewater
(Arrows show the points where aeration stopped or was abnormal.)

for the implementation of the project are summarized below.

Issues on work to be carried out by the Japanese side:

① Appropriate formation of a committee and active participation by the Ministry of Health and Welfare.

② Appropriate administrative work by JICWELS.

③ Thorough preparation at each stage of the project.

④ Provision of appropriate advice and arrangements by a JICA expert at the site.

⑤ Acquiring the assistance of johkasou manufacturers and their overseas affiliates.

⑥ Appropriate training by every relevant agency in Japan.

Issues on the Indonesian side:

① The local staff's awareness of the importance of and zeal for the project.

② Dissemination of information and enhancement of the local staff's awareness by holding a seminar.

③ Appropriate timing with the construction of a new office building.

④ Ability for wastewater treatment facility operation and maintenance and water quality analysis.

⑤ Technical level obtained by the staff through the long term assistance extended by SDC.

**Future Issues of Concern**

The use of the gappei-shori johkasou should be promoted in other residential areas and regions, and to do so would require the application of the ODA scheme. For this to go smoothly, however, an operation and maintenance system should be established.

(Kiyoshi Kawamura)

## Incineration of Municipal Solid Waste in Japan (3) - Waste Heat Utilization Technology -

It is estimated that waste heat generated by refuse incinerators has been utilized ever since the beginning of refuse incineration. For example, according to documents dating from those days, the Tokyo Fukagawa incineration plant constructed in 1929 was already equipped with a gas-type air pre-heater.

From then on, introduction of waste heat utilization has been continuously promoted, ranging from power generation in refuse incinerators to community central heating and air-conditioning. Along with the changes in the surroundings of incineration plants, the social meaning of waste heat utilization has also changed.

### 1. History

Ever since the first incinerators, piping which let water pass were installed in the flues of small-scale facilities to produce hot water.

Around 1965, when large-size continuous-type incinerators started to be operational, the number of facilities that produce hot water began to increase. Then, in addition to their use in plants, these facilities began to supply hot water to neighboring buildings, such as houses for the aged. However, as waste heat boilers were different from those currently used, waste heat utilization was limited and the scale of waste heat recovery operations was very small.

Around 1970, incinerators of the same type used in Europe were introduced to Japan. These incinerators were equipped with power generation facilities with waste heat boilers. The use of these boilers allowed the utilization of waste heat inside and outside incineration plants. In those days, the calorific value of refuse began to increase, local energy was reevaluated due to the oil crisis, and the importance of power generation in refuse incinerators increased. Technical progress also contributed to the switch to large-scale power generation.

Around 1975, heat recovery turned into full-scale operations, switching from hot water supply to heat supply. Recipients also changed from small individual facilities to neighboring public facilities, such as gymnasiums, botanical gardens, swimming pools, road heating systems and community central heating and air-conditioning systems as part of urban planning. As mentioned above, waste heat utilization expanded.

In this way, people's expectations toward refuse incinerators as regional sources of energy kept increasing, especially in the point of view of carbon dioxide emissions. Whereas exhaust gas is emitted in the process of thermal power generation, refuse incinerators do not emit additional carbon dioxide to generate electric power as waste heat generated by the incineration of refuse is reused. Power generation and heat supply from refuse incinerators are fairly environment-friendly operations. Now, environmental issues are taken seriously and the role of waste heat utilization will be even more important in the future.

### 2. Examples of waste heat utilizations in Tokyo

As mentioned above, the Fukagawa incineration plant was equipped with a gas-type air pre-heater using waste heat. Subsequent incineration plants were equipped with hot water generators.

In 1966, the Edogawa incineration plant equipped with a hot water generator was supplying hot water to a neighboring facility for the aged. In addition, the plant used waste heat for the gas-type air pre-heater.

The Shakujii incineration plant constructed in 1969 was equipped with power generation facilities for the first time in Tokyo. Subsequently, all incineration plants were fitted with this type of facility, and they started selling electricity to electric power companies. In 1975, seven incineration plants began to send electric power back to electric power companies. The Katsushika incineration plant built in 1977 had a large-size 12,000 kW power generator. The former Koto incineration plant, in addition

to power generation, started supplying hot water to a gymnasium in 1987 and to a botanical garden in 1988.

The Suginami incineration plant constructed in 1982 currently supplies heat to a community center and a pool in addition to power generation.

At the same time, large-scale community central heating and air-conditioning systems have been developed. In 1983, the Ooi incineration plant started to supply a neighboring residential area with hot water at 135°C. In 1998, the total calorific value supplied reached 41,000 kilocalories. The Hikarigaoka incineration plant built in 1983 supplies 12,000 houses with heat, the total calorific value supplied amounting to 35,000 kilocalories in 2000. There, a 45°C low-temperature heat supply system by heat pump using waste heat from a steam turbine was developed. The Ariake incineration plant supplies a newly-developed seaside city center with 180°C heat, the total calorific value supplied amounting to 76,000 kilocalories in 1998.

Most incineration plants cover their internal heating needs with their power generation operations. Especially, the Oota incineration plant operates a facility which melts ash by arc discharge using electric power generated in the plant.

Even when waste heat boilers were operated at high temperature and high pressure in Europe, a steam temperature exceeding 300°C was not adopted in Japan because of high-temperature corrosion. A long-term research on corrosion-proof materials carried out at the Adachi incineration plant made it possible to introduce high temperature and pressure boilers at 400°C and 40kg/cm$^2$ at the Shibuya and the Chuo incineration plants.

### 3. Waste heat utilization within the plants

Waste heat is utilized within incineration plants as follows:

① Preliminary heating of combustion air by steam, usually from 180°C to a maximum of 200°C.

② Re-heating of flue gas to prevent white smoke emission from the stack.

③ Use of high-pressure steam to eject any dust stuck on the boiler tubes.

④ Covering of the internal electric load with power generation from the refuse incinerator, and supply of surplus electricity to electric power companies.

⑤ Production and use of hot water for heating and hot-water supply.

⑥ Supply of air-conditioning using absorption-type refrigerators.

⑦ Prevention of freezing in measuring instruments.

### 4. Concerns and views on waste heat utilization in the future

In cold regions, waste heat from refuse incineration is a precious source of energy, used to melt snow on the roads, heat residential areas and digestion tanks of sludge treatment facilities, etc. It would be extremely efficient to incorporate such waste heat utilization facilities in urban planning.

Nowadays, as boilers can operate under high temperature and high pressure conditions thanks to progress in tube materials, high-efficient power generation has become possible. As a result, combined refuse incineration power systems will be available in the future.

As refuse incinerators require regular overhauls, waste heat cannot be used during certain periods. Consequently, an alternative energy source should be considered in case of heat supply, because it is not as easy to find another energy source for heat supply as for electricity supply, which can easily be obtained by connecting to other networks. (Akio Ishii)

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

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

REVIEW ARTICLE

***The current situation of solid waste generation and its***

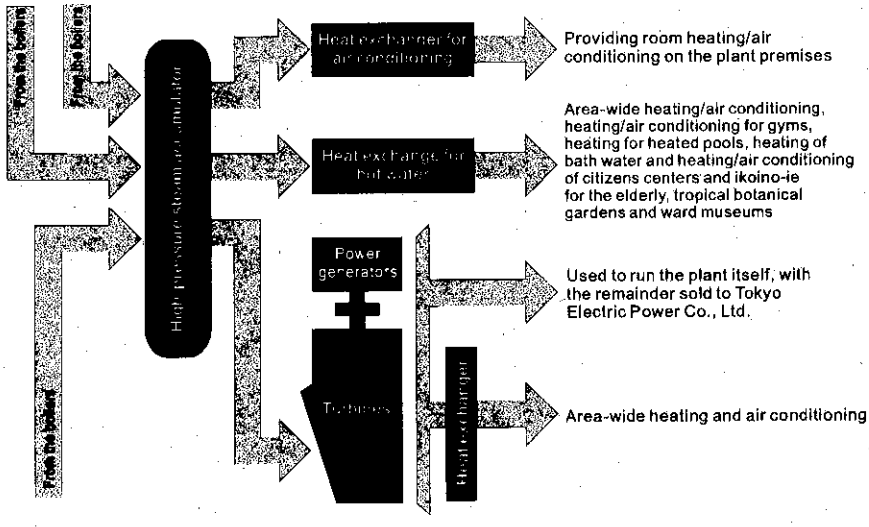



Figure: Flow Chart of Steam

***environmental contamination in China***
W. Wang, J. Jiang, X. Wu and S. Liang

ORIGINAL ARTICLES

***Evaluation of recycling policies of PET bottle based on multi-attribute utility indices***
A. Tokai and T. Furuichi

***Environmental impact assessment of sprayed-on asbestos in buildings***
A. Terazono, Y. Moriguchi, S. Sakai and H. Takatsuki

***Influence of bromine on metal volatilization in waste combustion***
J. Vehlow and F. E. Mark

***Porous structure of activated carbon prepared from waste newspaper***
M. Shimada, T. Iida, K. Kawarada, Y. Chiba, T. Mamoto and T. Okayama

***Effect of water-oil ratio on brine/surfactant/alcohol/oil systems optimized for soil remediation***
T. H. Tien and M. Bettahar

***Comparison of the weight-loss degradability of various biodegradable plastics under laboratory composting conditions***
A. Ohtaki and K. Nakasaki

***Evaluation for the effect of automotive bumper recycling by life-cycle inventory analysis***
M. Makuta, Y. Moriguchi and Y. Yasuda

NOTES

***Studies on materials containing polysaccharides as the soil amendments***
***(1) Effects on animal water purification in a potting experiment***
N. Takada-Oikawa, N. Katoh, T. Oshida, S. Kawanabe and T. Kaise

***Composting of food refuse from a student restaurant in Hokkaido University***
T. Maeda, J. Matsuda, H. Nakashima, K. Yoshida and J. Suzuki

**Journal of the Japan Society of Waste Management Experts, Vol. 11, No.4 (July 2000) and Vol. 11, No.5 (September 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.4 (July 2000)》**

Paper

***An Estimation of Air Pollutants Emitted from Low Emission Vehicles for Municipal Waste Collection***
Noboru Tanikawa, Toshio Takemoto, Hisashi Yokota, Masanao Funeshima and Kohei Urano

***An Automatic System for Disassembling Post-use Electrical Home Appliances***
Yuko Okada, Toshiyuki Aoki, Masakatsu Hayashi, Kouji Tagusari and Takeo Takagi

***Influences of Various Factors on Cadmium Removal Efficiency from Scallop Waste***
Youichi Sakuta, Nobuhiro Nagano, Keiichi Tomita, Motoomi Wakasugi, Takayuki Saitoh, Kazuyoshi Shimakage and Toshimori Kitazaki

***Experimental Study on Developing Uses of RDF by Carbonization***
Katsuhiko Yamamoto, Shin-ichi Misawa, Kazuhiko Hizuka and Ryouhei Mimura

***Effects of Static Aeration and Scooping up on the Composting of Garbage***
Hiroshi Eya

***Waste Stream Model of Household Waste and its Parameter Estimation***
Toshihiko Matsuto and Nobutoshi Tanaka

**《Vol. 11, No.5 (September 2000)》**

Paper

***Chemical Properties of Sosei Paper Made from SPWS and BWS, and Fundamental Study on Growth Test of Green Pakchoi***
Masahito Yamauchi, Nagisa Kiyomoto, Tokio Hirata, Yasushi Matsufuji, Sumio Masuda, Yuji Maeno, Kenjiro Yoneyama and Masataka Hanashima

***Evaluation of Recyclability and Disassembility of Videotapes***
Toshiaki Shimizu, Yasoi Yasuda, Hitoshi Ohya and Atsushi Inaba

***Resource Recycling Society Indicators on Solid Waste Management and Questionnaire Surveys in Metropolitan Cities in Japan***
Toshihiko Matsuto, Nobutoshi Tanaka, Masaru Tanaka and Tomoo Sekito

***Analysis of Factors Determining Collection Volume of Household Waste***
Toshihiko Matsuto, Nobutoshi Tanaka and Naofumi Sawaishi

***Estimate for Waste Generation from Future Building Demolitions***
Seiji Hashimoto and Yutaka Terashima

***Statistical Analysis of Variability of Test Data by Sampling Methods of Multicomposition Wastes***
Tomohiro Tasaki and Kohei Urano

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