

JAPANESE GOVERNMENT POLICY TOWARD DIOXIN CONTAMINATION AND A RESCENT RESIDENTIAL SOIL POLLUTION INCIDENT IN TOKYO

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Introduction

The finding of heavily dioxin contaminated residential soil in Tokyo brought up serious health concerns among residents. The local metropolitan borough government and the metropolitan government of Tokyo are challenged with technological and financial problems. Here I briefly summarize the legislative frameworks concerning dioxins in soil, outline this incident of dioxin contamination, and discuss significant points particular to dioxin contamination in residential soil.

Materials and Methods

Data and information were gathered from sources available to public such as newspapers, web pages and publicized government reports. English titles given to referenced materials are in most cases temporal translations by the author for the convenience of the reader. When original materials are in Japanese, it is indicated as such in the References.

Results and Discussion

1. Legislations

1.1 Environmental Quality Standards for dioxins in Soil

The Law Concerning Special Measures against Dioxins¹ provides that the government sets environmental standards for dioxins along with the Tolerable Daily Intake (TDI) as the basis for all the measures against dioxins. In accordance with the Law, Japanese Environmental Agency (reorganized into the Ministry of the Environment (MOE) in 2000) established the standards and set the upper limit of Dioxins in soil at 1,000 pg-TEQ/g². The TEQ (Toxicity Equivalence) value is provided by the Law to indicate dioxin levels in regulations and to be calculated using WHO TEFs (Toxic Equivalency Factors)³, which specific numbers are written in the enforcement regulations of the Law⁴. The Law prescribes TDI to be set by a cabinet order at 4 pg-TEQ/kg-bw/day or under, and the enforcement order of the Law⁵ set the TDI at 4 pg-TEQ/kg-bw/day (Article 2).

1.2 Rules on polluted soil under the law concerning Special Measures against Dioxins

On the other hand, the Law Concerning Special Measures against Dioxins prescribes that the governor of the local prefectural governments bears responsibilities to regularly monitor dioxin levels in the environment and

Table 1. Standards and limits under the Special Measures Law on Dioxin Control.

Environmental Standard:			
Ambient air			0.6 pg-TEQ/m ³ (max. annual average)
Water			1 pg-TEQ/L (max. annual average)
Sediment			150 pg-TEQ/g (max.)
Soil			1,000 pg-TEQ/g (max.) (Action level: 250 pg-TEQ/g)
Emissions to air:			
			(Unit: ng-TEQ/m ³ N)
Waste incinerators	New facilities		0.1 – 5 (specified by capacity)
	Existing facilities		1 – 10 (specified by capacity)
Furnaces and industrial processes	New facilities		0.1 – 1 (specified by type)
	Existing facilities		1 – 10 (specified by type)
Emissions to water:			
			10 pg-TEQ/L (max.)

Discharge from Specified facilities: bleaching facilities that use chlorine, ethylene dichloride cleansing facilities for the production of vinyl chloride monomers, waste PCB resolving facilities, emissions gas scrubbing and wet dust collecting facilities of incinerators, and the waste water disposal facilities of above.

report to the Minister of the Environment (Chapter 4). Soil dioxin level is set as one of the targets of monitoring along with the dioxin levels in air and water including sediments. The governor is obliged to make plans for dioxin monitoring in his prefecture consulting with local office of the central government and local authorities. The monitoring is carried out by the local office of the central government or local authorities. The results are reported to the governor, which are then publicized. On finding the polluted soil, which is the level above the set environmental quality standard of dioxins for soil, the governor is given the right to order the contaminated area be designated as "Dioxin Contaminated Area for Antipollution Measures". Once the "Area" is designated, the governor is obliged to establish the "Countermeasures" without delay consulting with mayors of the related local authorities and public hearings summoning community residents, under the consent of the Minister (Chapter 5). The Polluters Pay Principle is going to be applied when the clear causal relationships based on scientific knowledge is shown between the past emission of dioxins by the business and the current contamination.

2. Dioxin contamination of residential soil

2.1 Description of the contaminated land

The contaminated area found is in the north east of Tokyo adjacent to Sumida-river. The site was an industrial area in the past. The former Urban Development Corporation (united with the Japan Regional Development Corporation in 2004 to form the Urban Renaissance Agency) created a residential area with 14 story apartment buildings to house 4,959 families along with a kindergarten, schools, and parks. The facilities went into service in 1972 and 1973.

2.2 Time-line of the incident

2004 Dec. Dioxin Contamination in two pieces of land next to the residential area was found when the Urban Renaissance Agency purchased a former gas station and factory sites to build new apartments and a park according to the district plan and the former owners carried out the soil investigation on 24 hazardous chemicals as ordered by the regulation of the metropolitan government of Tokyo⁶ and voluntary on dioxins. The levels of contamination of the former gas station are found on the web pages of the oil company that operated the station (Table 2a). On the contrary, the other of the former owners, a food oil and chemical company, reveals no information (Table 2b). The companies held explanatory meetings for the local residents within the same month and finished cleaning the sites shortly after (Table 3a).

2005 Jan. and Feb. The local government carried out soil investigation on a closed down elementary school lot within the residential area in a plan to build a special elderly nursing home and found dioxin contamination. The government investigated nearby public facilities such as the kindergarten, schools and parks and found more dioxin contamination.

Table 2a. Levels of contamination

Lot A: Former gas station operated till 2004 March

Media	Contaminants	Level	Standard
Soil	lead	1,700 mg/kg	<150 mg/kg
	fluoride	10.0 mg/l	<0.8 mg/l
	dioxin	200,000 pg-TEQ/g	<1,000 pg-TEQ/g
Ground Water	lead	0.023 mg/l	<0.01 mg/l
	benzene	0.14 mg/l	<0.01 mg/l

Reported on the company's web site

Lot B: Former food oil and chemical company

Media	Contaminants	Level	Standard
Soil	dioxin	6,600 pg-TEQ/g	<1,000 pg-TEQ/g

Reported on a NPO's web site

Table 2b. Levels of dioxins in soil

Investigations by the Local Government

2005 April	Closed Down Elementary School (-1m) Kindergarten playing lot (surface) Park	2,700 – 14,000 pg-TEQ/g 1,700/2,200 pg-TEQ/g 1,300 pg-TEQ/g
Reported in a news paper article (Asahi. April 20, 2005)		
2006 June	Park (-2m)	590,000 pg-TEQ/g
Reported in a news paper article (Sankei. June 8, 2006)		

- 2005 April The outcome of the investigation was publicized (Table 2b) and explanatory meetings were held by the local government. Contaminated sites were closed to public and the playing lot of the kindergarten was covered by plastic sheets.
- 2005 June Dioxin contamination was found in another of the former factory site near the residential area bought by the Urban Renaissance Agency, explanatory meetings were held and the clean-up took place. Up to November this year, more dioxin and heavy metal contamination was found as investigations by the Urban Renaissance Agency and the local government proceeded.
- 2005 Dec. The local government requested to the metropolitan government of Tokyo that the contaminated sites in public land under its management be appointed as "Dioxin Contaminated Area for Antipollution Measures" and the metropolitan government takes charges of countermeasures.
- 2006 March The metropolitan government of Tokyo appointed the area as "Dioxin Contaminated Area for Antipollution Measures", but there is still no agreement on which government should take the responsibility of the clean-up operation.
- 2006 June Highest level of dioxins ever in Tokyo (590,000 pg-TEQ/g) was found in the soil two meters below the surface in a park outside the appointed area.

2.3 Clean-up activities

Clean-up operations of the two areas in possession of the Urban Renaissance Agency were complete within short period of time (Table 3a and 3b). On the other hand, the clean-up of the residential area remain deadlocked between the conflicting plans of metropolitan and local governments (Table 4).

Table 3a. Clean-up of the contaminated site found in 2004

2005 Feb. - June	3,000 pg-TEQ/g< > 3,000 pg-TEQ/g	808 t 1,778 t	glass melting disposal to controlled landfill site
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Table 3b. Clean-up of the contaminated site found in 2005

2005 Nov. to 2006 March	3,000 pg-TEQ/g< > 3,000 pg-TEQ/g	836 t 460 t	glass melting disposal to controlled landfill site
Announcement by the Urban Renaissance Agency. March 2006			

Table 4. Clean-up plans of the metropolitan and local governments (as of April, 2006)

	Metropolitan Government Plan	Local Government plan
Responsible Organization	Local Government	Metropolitan Government
Procedure	Covering up	Change of soil
Additional Statements	Revision of the plan should take place only when the land use changes or an innovative treatment technology becomes available	Kindergarten lot soil should be exchanged as soon as possible. Covering up of soil should be temporal and the metropolitan government should manage the risk pertained to this measure.

3. Legislative shortcomings regarding dioxin contaminated residential soil

The incident illustrates clearly the shortcomings of the current dioxin legislation when coping with residential soil contamination:

1. Protection of residents' health needs to be written as a priority.
The present legislative framework does not provide to the local public entities any guidance or legal power to handle the issue from the stand point of protection of public health. The Law only assumes the residents as property owners who are responsible for the clean-up, that is not so in this case.
2. Health risk assessment of alternative measures should be written as indispensable.
The law prescribes the clean-up measures are to shut off exposures and give examples such as covering and removal. With residents living on the site, however, substantial cares are needed to be taken to prevent the exposure during clean-up operations themselves.
3. Decision based on science should be agreed upon as the means of consensus building among the stakeholders.
The residents fearing for the health of children and themselves are asking for complete elimination of contaminants. While their request is quite natural, such operation being safely performed in a residential area seems almost impossible. Through discussions on the basis of science may be the only way to reach the consensus on any future plan of the area.
4. Stronger financial support by law is needed.
The dioxin contamination of the residential area is suspected to have an origin in the past operation of a chemical company on the premise, which is reported to have produced 2,4,5-T herbicide among other chemicals. There is no report indicating that responsibilities of this company have been discussed yet.
The metropolitan government assessed the cost of changing the soil sum up to impractical \$700 million (100 billion yen) and recommended the covering up of the contaminated soil *in situ*, which should block the exposures and cost some million dollars only. As the resource for the clean-up cost, local public entities may apply for and receive national aid fund for clean-ups: The national treasury grants-in-aid subsidizes 50 to 55% of the clean-up cost; the national government preferentially accepts 70% of prefectural government bonds or 75% of municipal bonds⁷. In spite of these and other preferential treatments, the cost of clean-up operations is still a financial burden for any entities. For an example, it was estimated for 1999, what was spent on clean-up operations nation-wide summed up to 875 billion yen, while what was subsidized by the national government was 49 billion yen in total, 5.5 % of the whole expense. To speed up the clean-up process and not to prolong the potential health risk from contaminated soil, instruments to ensure financial support is surely vital.

References

- ¹ Law Concerning Special Measures against Dioxins. (Law No. 105 of 1999. Promulgated on July 16)
- ² Environmental Quality Standards Concerning Dioxin Contamination of Air, Water and Soil (Environmental Agency Proclamation No. 68 of 1999. Promulgated on December 27) (In Japanese)
- ³ WHO TEFs for human risk assessment based on the conclusions of the World Health Organization meeting in Stockholm, Sweden, 15-18 June 1997
Van den Berg et al., 1998, Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife. *Environmental Health Perspective*, 106 (12), 775-792, 1998
- ⁴ Enforcement Regulations of the Law Concerning Special Measures against Dioxins (Order of the General Administrative Agency of the Cabinet No. 67 of 1999. December 27) (In Japanese)
- ⁵ Enforcement Order of the Law Concerning Special Measures against Dioxins (Order of the Cabinet No. 433 of 1999. December 27) (In Japanese)
- ⁶ Regulation Regarding the Environment for securing health and safety of the citizens of Tokyo (Regulation of the Metropolitan Government of Tokyo No. 215 of 2000. December 22) (In Japanese)
- ⁷ Law Concerning Special Financial Measures of National Government on Projects against Pollution (Law No. 70 of 1971. Promulgated on May 26) (In Japanese)