Policy on Purifying Contaminated Sites in Japan and Germany

— Points that Japan Should Learn from Countermeasures
Against Soil Contamination in Germany —

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Abstract

After the enactment of Japan's Soil Contamination Countermeasures Law in 2002, landowners, particularly private firms and enterprises, were obligated to shoulder a new risk. Compared with other countries, Japan's implementing of government regulations and providing fiscal support in this field have been too little and too late. Consequently, Japan should promptly consider necessary means of implementing environmental protection measures, information disclosure, and a system of financial support.

The purpose of this research¹ is to verify practical measures that can be taken in the future to address the issue of contaminated areas in Japan. In order to survey and summarize the overall situation regarding soil-contaminated areas, we relied on the experience in Germany, where the economic situation is similar to that in Japan. With reference to a case study conducted in Germany, we analyzed practical measures to achieve purification, considered the influence of the central government and municipalities, and characterized the difficulty of practical implementation².

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1. Introduction

The significantly high rate at which land is currently being developed, which has assumed a magnitude about more than 100 hectares per day (equivalent to about 150 soccer fields), is one of today's most serious threats to nature and landscapes in Germany³. Most of the land being developed is mainly used for roads, industrial (commercial) parks, and residential areas. The problem of contaminated sites is posed when a factory is shut down and the site redeveloped. Such industrial sites are called old brown coal fields. As a result,

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¹ This paper is a revised version of the theme on which it reported at the international Meeting PRSCO (The 19th Pacific Regional Science Conference) held by the Nihon University College of Economics Tokyo on 24 July 2005.

² To our regret, it became difficult to continue this research due to the sudden death of the superintendent Prof. Keiichi Tanaka, who headed the research. Therefore, this research project ended with a temporary respondent report.

³ The current rate of land consumption in Germany is still much larger than the target of 30 ha/d established by the national Sustainability Strategy. See [3] pp. 59)

such polluted area and sites of contaminated soil become new environmental burdens imposed on the World, and the cleanup and elimination of contaminated sites will be one of the most extensive tasks undertaken in this century.

In the soil contamination cover-up case that occurred in Osaka recently, the files on two real estate firms were sent to the prosecutor's office due to violation of the Building Lots and Buildings Transaction Business Law for not notifying information on soil contamination, which constitutes important matters, at sales of the apartments. The point of dispute in this case was the obligation to disclose contamination information involved in redevelopment of a tract of land from which factories have been removed, which made us realize that soil contamination is becoming a new risk for companies involved in land utilization. The regulations imposed by the government and information disclosure on soil contamination in Japan are seriously lagging behind the world standard; it is necessary to take various aggressive measures immediately, including pollution prevention, decontamination treatment and registration of contaminated areas (sites). This study aims to learn valuable lessons from cases of specific regulations and treatments found in the environment pollution measures in Germany in order for Japan to be able to implement soil contamination counter-measures in an efficient manner in the future.

2. Current conditions of soil contamination in Germany

In Germany, where the federal states have extensive authority of self-government, there were various gaps in the scope and statistics, regulations and decontamination treatment methods of soil contamination among individual states, and it was necessary to integrate these at the federal level in order to obtain an accurate understanding of the actual conditions. For this reason, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety formulated several drafts, and the Federal Soil Protection Act (BBodSchG) was formulated in 1998; furthermore, recently, the federal government has started promoting integrated registration of statistics on contaminated areas and standards regarding information disclosure.

According to the German environment white paper of 2004, the total number of sites suspected of soil contamination amounts to 362,689, and each state is aggressively carrying

Table 1: History of contaminated sites in Germany

1965	Federal Area Planning (ROG)
1971	Environmental Council (SRU) established
1972	Refuse Disposal Law (AbfG)
1972	First Umweltprogramm
1974	Federal Emission control law (BImSchG)
1974	Federal Environmental Agency (UBA) established
1983	Dorstfeld Scandal (Dicyclopentadein)
1986	The Federal Environment Ministry (BMU) established
1991	Federation/land working group (LABO) established
1997	(BauGB) Revision of law
1998	Federal Soil Protection Act (BBodSchG)
1999	Contaminated Sites Ordinance (BBodSchV)

out decontamination and information processing as specified by the Federal Soil Protection Act. But when we see the latest report of the government party (SPD/ Alliance '90/The Greens) based on Soil contamination protection organization (LABO: Federation/land working group Bodenschutz) in 2005, the number of sites changes to 232,558 (plus 10,595 fixations). This is not meant that purification had been rapidly advanced only just one year. The statistical data, which had been announced over many years to public until recently, had not been updated enough. This is also shown that Germany is still at the arrangement stage. Therefore, Germany is now the largest market for contaminated site remediation services in Europe. By the year 2005, the market for contaminated site remediation services in Germany is expected to be USD 515.16 million, accounting for 31.8% of the total European market [1].

By definition, the soil contamination in Germany is classified into two major categories according to the Federal Soil Protection Act: areas with buried contaminants (former waste disposal sites) and former industrial areas (sites from which factories have been removed). Each state has reconstructed data according to the federal standards and certified/disclosed soil contaminated sites in its own right.

Moreover, specification of "harmful changes to soil" is also important, although they do not represent contaminated soil sites. These refer to hazardous sites where the functionality of the land is lost and considerable problems are seen in individual or general areas and are regarded to match the meaning of the concept of "harmful effects to the environment" in the Federal Emission Control Act. "Harmful changes to soil" are under obligations of the land owners or parties with the power of authority, while the decontamination obligation of "contaminated soil sites" is borne not only by the current land owners, but also the parties that caused the contamination and the successors of their plenary power, as well as the parties holding the actual executive power of the land in question. For this reason, the previous owner of the land in question may have associative responsibility of decontamination, depending on the condition. Moreover, according to the German system, areas where decontamination treatment has been completed remain in the contamination statistics and decontamination methods and other information are recorded using special contamination maps in the survey reports as proof that the decontamination is completed; that is, records of the contamination are kept instead of being eliminated. The survey reports are not disclosed to the general public, and getting to see them require specific authorization.

Next, the standards of contents of hazardous substances remaining in the ground also form the basis of judgment of soil contamination, and the values are being standardized under the guidance of the federal government. The standard values for the range and types are specified in the Federal Soil Protection Act, where Part II of the act prescribes detailed rules for predicting the degree of risk in areas suspected of soil contamination as well as for evaluating survey results of harmful changes to soil, areas suspected of soil contamination and contaminated soil areas. These constitute the practical standard values for judging the degree of risk, i.e., inspection values (trigger values) and control values (action values). These standards of the restriction/regulation value is severely provided by government specialized agency, for instance SRU (German Advisory Council on the Environment) and LABO.

According to the Federal Soil Protection Act, inspection values is the values which, if exceeded, shall mean that investigation with respect to the individual case in question is required, taking the relevant soil use into account, to determine whether a harmful soil change or site contamination exists (Article 8), and action values is the values for impacts or pollution which, if exceeded, shall normally signal the presence of a harmful soil change or site contamination, taking the relevant soil use into account, and to mean that measures are required (Article 8).

Lastly, let us take a look at some case studies from the North Rhine Westphalia (NRW) state to get an insight into the actual decontamination methods. This state has approximately 52,000 contaminated sites. In the countermeasures against soil contamination used in the state, the status of contamination in the entire area is first analyzed in detail by studying aerial photos, land history investigation, hearings, etc. by the State Environment Agency (LUA) and lower-level regional environment agencies (StUÄ) based on the federal inspection standards. Subsequently, the degree of risk is assessed based on the standards set by the state and if it is judged that countermeasures are required, the purification is carried out under continued inspection and the contaminated soil areas are reformed according to the decontamination plan.

As for decontamination treatment as well, cutting-edge scientific purification technologies such as treatment by microorganisms and heat, complete replacement and sealing of soil, etc. have been introduced, and monitoring by municipality authorities during and after purification also plays an important role in the regular inspections and construction manage-

Sources: [2] pp.42.

Figure 1 : Contaminated Sites Research and Purification example in Germany (NRW)

ment planning.

A concrete case is easily seen here. There was a zinc factory in Figure 1, and operation was stopped in 1873. Afterwards, the construction of the church was done at the beginning of 1900's. And city construction was continued afterwards, though it turned out during construction, those harmful materials existed widely in the soil. But urban development continued furthermore. In 1995, this city Mühlheim finally began the investigation of soil pollution in earnest. And in accordance with the enforcement of federal law, a real reproduction of this region was accelerated.

In Germany by the risk assessment, as for the standard of pollution, not only human but also the influence on flora and fauna (Animal and plant) is investigated strictly too. In addition, the criteria are different also according to the usage of land. The restriction value is depending on the land utilization. After all, there were a lot of chemical contents of lead, and the inspection (trigger) values were exceeded by most divisions especially.

3. Characteristics of countermeasures against soil contamination in Germany

Although Germany is often referred to as an environmentally advanced country, it was not as fast as the US or the Netherlands to introduce regulations regarding soil contamination. On the other hand, ever since the soil contamination problems started to become an issue of global awareness around the latter half of the 1970s, the German government has been working continuously on thorough preparations until the enforcement of the policies in 1998. It is obvious that the German government took the time required to implement a thorough soil contamination administration, in such a way that it is now highly mature in each phase of investigation, decontamination, regulation and information registration.

The background for the German measures against soil contamination is quite common in that the authorities did not start taking measures until they were faced with an environment scandal. In the soil contamination case in the southern part of the Dorstfeld area of Dortmund city in the NRW state, the city acquired a tract of land from which factories had been removed and distributed the land and built rental housing worth 192 households. In 1981, citizens complained to the authorities about offensive odor coming from the tract of land, and soil contamination was revealed. The city consigned and conducted a soil investigation and, as a result, a large quantity of hazardous substances were discovered in the ground, which led to excavation/removal of approximately 50,000 m³ of contaminated soil and caused the case to be highly publicized in the mass media. Due to this turmoil, land prices dropped sharply—not only in Dorstfeld, but in the entire Ruhr area; citizens demanded compensation for health hazards as well as psychological damage and economical loss, and the city also suffered a great deal of losses and expenses.

Since then, the NRW and other states started to make genuine efforts toward investigating and surveying the actual conditions of pollution. The administration on the local level necessarily plays a great role in investigating the actual conditions of soil contamination because the task is strongly related to local authorities. In addition to pollution standard values (trigger values and action values) prescribed by the enforcement regulations of the federal act, each state sets its own potential background values. These are standard values considered to represent so-called topsoil values unique to each tract of land. In other words,

the values involve calculation of individual geographical data unique to an area as well as data on comprehensive environment load caused by human activities other than pollution, such as road and river site conditions. These potential values are calculated differently in each state and are mostly positioned at levels below the inspection values, but for instance the presence of heavy metal accumulated around copper mines in the NRW state yields an exceptionally high potential value.

States play an important role in decontamination as well. The federal act does not set any final goal for decontamination, leaving it to local authorities to set the final goal for each contaminated area based on reasonable standards. Thus, given that the soil characteristics are different from area to area, decontamination is not completely unified on the federal level; the decontamination target for each area is derived from efforts of local citizens and urban planning.

On the other hand, regulations on target areas and contaminants are strict. The federal act prescribes standards for inspection and control values (dioxin) for contents of 14 types of contaminants including arsenic and cadmium for each of the four living zones. Other substances are also investigated individually for the degree of risk by each state and the data is examined for conformation to the environment standards by the federal and state joint organization on soil contamination (ALA).

Germany is also making active efforts regarding organization/registration and release of pollution information to the public. As of June 2001, there were programs for a total of 45 sites and soil contamination cases (data collection and disclosure) in the entire Germany, and each state processes information on pollution making use of models developed uniquely or jointly among these programs. The NRW state, in particular, is ahead of other states in its work on digitalization of land information (BIS); its creation of environment information goes back to the space monitor system in 1982. Although it also updates information on soil contamination (ISAL), the entire area is not covered, and the access to the data is restricted to members of the administration because the original system used to be a database for information input and exchange among authorities, implying that not all pollution information is open to the public. Basic data such as maps of areas with soil contamination and decontamination information is actively provided through the Internet as well as in response to individual inquiries at cost, however.

4. Actual conditions of soil contamination in Japan

Japan formulated the “Soil Contamination Countermeasures Law” in 2002, i.e., four years after Germany. However, there are significant gaps in the contents between the Japanese law and corresponding German act. In Japan, like in other countries, the existence of soil contamination came into focus due to actual problems caused by environmental contamination—in this case, disease caused by pollution—but when it came to soil contamination in urban areas, the causes, routes of contamination, effects, etc. were not well understood or kept secret within firms, and the actual conditions were seldom revealed. Moreover, the authorities handled the situations through administrative advice, which holds no legal power, and the regulations and investigation of pollution of Japan were lagging seriously behind those of other countries.

Table 2: History of contaminated sites in Japan

1880's	Totigi Ashio Scandal (Copper)
1920	Miyazaki Toroku Scandal (Arsenic)
1967	Basic Law for Environmental Pollution
1968	Toyama Scandal (Cadmium)
1970	Basic Law for Environmental Pollution (1967) Revision of law
1970	Agricultural land soil pollution prevention Law
1975	Tokyo Scandal (Chromium (VI) Compound)
1989	Brownfields Mitsubishi Osaka (Arsenic, Selenium) to OAP Environmental Quality Standards for Soil Contamination 10 material
1993	Basic Environment Low
1994	Environmental standards (1989) Revision of law 10+15=25 material
1999	Law Concerning Special Measures against Dioxins
2001	Environmental standards Revision of law 25+2=27 material Brownfields Mochida Tokyo (Trichloroethylene) to Apartment (Unachievement) Brownfields Nissan Tokyo (Trichloroethylene) to Ecclesiastical Corporation Brownfields Sumitomo Tokyo (Arsenic, Benzene) to Apartment house
2002	Soil Contamination Countermeasures Law
2003	Brownfields Matsushita Osaka (PCB) now operating Brownfields Sanyo Osaka (Copper, Arsenic) under construction
2004	Brownfields Toshiba Kawasaki (Cadmium) to Cannon Brownfields Mitsubishi Nagoya (Trichloroethylene) Now operating

According to a survey by the former Environment Agency, only 232 soil contamination cases were known nationwide by 1994. In the latter half of the 1990s, local authorities finally started to formulate bylaws and outlines on soil contamination and the standards set by the Ministry of the Environment related to pollution were expanded to cover 27 items in 2001 (only 10 items were covered in the original formulation from 1991). According to the latest soil contamination survey by the Ministry of the Environment, 987 cases of pollution were investigated and confirmed in fiscal year 2002 and the cumulative number of investigated cases reached 3,380. This figure is also far removed from the actual conditions of soil contamination, however. The Ministry of the Environment bases its investigations on questionnaire surveys and investigated cases known after 1975 only. The figure is thus far too small compared to Germany, which is similar to Japan in terms of population, area, industrial structure and economic development, and clearly shows that countermeasures against soil contamination are lagging significantly behind in Japan.

Here is also seen a concrete case in Japan easily. The figure 2 is a one case with the sites investigation of north area in Tokyo. The powder mill was here before. When owner's railroad company constructed the company house in accordance with the law in 2002, the investigation was executed. As a result, reported to authorities that mercury and lead that exceeded the reference (inspection) value were detected. And it was found by investigating the second.

This sites investigation and information disclosure by City Tokyo and Municipality was pioneering but it ended only two chemical materials (Lead and Silver). The restriction and the purification measures of the poisonous substance headed mainly by government initiation

Sources : <http://www.city.kita.tokyo.jp/kankyo/kankyo/kogai/taki3tizu.pdf>

Note : Circle ; Soil investigation. (17 points)

Square ; Underground water investigation. (10 points)

Triangle ; Air investigation. (4 points)

Figure 2 : Contaminated Sites Research and Purification example in Japan (Tokyo)

are still limited like this. Therefore, the remediation procedure for contaminated sites in Japan just still started and the case and experience with more useful foreign countries should be absorbed from various viewpoints for that.

Moreover, the countermeasures law aims to prevent health hazards to people, but only areas where investigation is mandated are regulated. Furthermore, the obligation to investigate existence of soil contamination is placed on the owner side and the administration employs a system where it designates contaminated zones as well as takes measures and gives instructions based on reports from the owner side. For this reason, registration and management of contaminated zones carried out by the administration side are reactive and not thorough, and the disclosed pollution information is limited to individual information items registered in ledgers of designated zones. Needless to say, contamination maps based on substances regulated by the government have not been created and disclosure of information on soil contamination has not been established as a system in Japan.

5. Points that Japan should learn from Germany

First of all, it is essential that the Japanese authorities engage in thorough investigation of actual situations, decontamination, regulations and information disclosure, as it is done in Germany. Currently, since investigation of soil contamination is directly linked with business costs, the Japanese administration does not attempt to identify all so-called “potential

contamination candidate areas”, which represent a greater risk than areas with “specific fear of contamination”. For example, the NRW State Environment Agency has been identifying areas suspected of contamination from fiscal year 1988 based on unified standards from surveys of the entire area and specific areas. Areas under suspicion are marked on maps and appraisal investigation is carried out, and the result of decontamination is recorded with the case number in maps.

The countermeasures law in Japan also obliges firms that convert sites from which factories have been removed and similar into commercial facilities and residences to carry out investigations and allows municipalities to issue decontamination orders. However, it is too late to take countermeasures after clear health hazards have already occurred. It is important that construction contractors voluntarily carry out investigation as well, but it is first desired that the administration will conduct overall contamination investigation and history of these activities should be recorded and kept without being deleted even after the decontamination is completed; such a procedure would be effective in heightening the liquidity of land transactions as well.

Moreover, decontamination processing has not been enshrined into clear-cut law in Japan yet and a great deal of arbitrariness is thus likely to remain in the methods used for land cleaning and the levels of decontamination, and the risk assessment is not independent either. In order to avoid problems between developers and citizens as well, it is necessary to strengthen collaboration in communities from the phase of decontamination planning, from the administration side, such as submitting decontamination plans to the authorities as well as holding explanation meetings with local citizens.

Secondly, many of the Japanese regulations on soil contamination are restrictive and have many so-called “loopholes”. It is not enough to regulate only “health hazards to humans” by laws; the regulation range should be expanded to aggravation of living environment and maintenance of the eco-system as in Germany. The obligation of investing areas subjected to regulations should not be limited to at closedown, but should be extended to during operation and at usage changes. In reality, strict regulations on the municipality level are desired.

In addition, the types of regulated substances and standard values (concentration level) have begun to serve as simple and absolute bases of judgment. Considering the feasibility of contamination regulations in Japan under the current conditions, the risk assessment for each region and comprehensive content standard values employed in Germany cannot necessarily be said to be suited, but establishment of constraints (addition of new controlled substances and changes of standard values taking environment conditions into consideration) with the future in view should nonetheless be considered.

In Germany, the Federate and state authorities jointly investigate and study contamination standard values, and an independent government organization (LABO) provides advice to municipalities. So it would be highly desirable to set up a similar specialized organization to establish comprehensive guidelines on controlled substances in Japan as well.

The third point that Japan can learn from Germany is disclosure of information related to contamination. In Japan, soil contamination zones are registered based on contamination investigation data submitted to the Ministry of the Environment and the general public can

view the data freely without charge. Information of areas not designated as contaminated is not disclosed even if the fact of contamination is known and no legal charge can be brought against it, however. In the case of contamination revelation in Osaka explained above and others, importance of voluntary notification obligation of firms is recognized again, but the risk at land transactions and redevelopment is kept to a minimum by forced information disclosure based on fixed standards of the authorities. One of the future challenges in Japan is the construction of a system that allows local citizens to obtain information on contamination easily, for example through the Internet, just like in Germany.

6. Conclusion

The issues involved in soil contamination are controversial, not only in Japan and Germany but everywhere; there are difficulties in terms of placing responsibility for causes of contamination, necessity of spending public funds for decontamination, disclosure of contamination information versus the rights of privacy of firms etc., and the German methods cannot necessarily be said to be the best. The issues on financing the decontamination are causes of problems in any countries. Moreover, even Germany does not have a complete overview of the contamination within its borders at this stage yet. No country can argue against the point that contaminated lands should be decontaminated and re-contamination prevented, however, and it is an indisputable fact that Japan is lagging behind other countries in countermeasures against contamination. What Japan should learn from the countermeasures of Germany against soil contamination, which this paper examined, is to obtain a thorough understanding of the actual situation and ensure a reinforcement of the role of the administration, plainly speaking. In other words, the government must address contamination more fairly and strictly than it has been done so far, and work aggressively toward solution and prevention of soil contamination problems.

Our conclusion that turns out by this research is not a novel idea. It stays in the general opinion which is a part already been insisted. But there is no shortcut in the environment policy. Only a steady environmental administration is necessary for Japan. After such a basic route is followed, then we can make the effect on reformative policy. Recently, Germany has begun (e.g., through regulations by taxation) to reduce the construction of unnecessary paved roads etc. in order to maintain various functions of the soil and recover natural self-cleansing function of the land (e.g., improve rainwater penetration to prevent flood disaster), which are policies Japan can use as reference in the future.

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