A study on collaborative environmental risk management : modeling to facilitate the prevention of soil contamination by local governments, businesses, and local stakeholders

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CHAPTER TWO

BACKGROUND ON SOIL CONTAMINATION LAWS IN THE UNITED STATES, GERMANY, AND JAPAN

2.1 BACKGROUND ON SOIL CONTAMINATION LAWS AND REGULATIONS

The present reflects the past, and our past mistakes should lay the groundwork for preventing a repeat of the same in the future. This section provides an overview of past legal issues and regulations pertaining to soil contamination in the United States, Germany and Japan that reveal the hazards ignored in past. In addition, cases illustrating the environmental risks local governments and businesses face from political pressure and citizen involvement lend support for the need for prevention proposed in this thesis.

The United States was chosen for comparative analysis because of its long experience, diverse cases, and innovative approaches in dealing with soil contamination. Germany was selected as the other country because of its progressive environmental programs, economic and demographic similarities to Japan, and its close resemblance to Japan's postwar environmental pollution dilemma brought on by rapid rebuilding of the infrastructure, industry, and urban areas.

History has repeatedly shown that an environmental crisis can trigger a strong social response; and in some cases, has forced governments to pass regulations to control violators. History has also shown that the media can have a huge impact on affecting public opinion about an environmental crisis. The "Love Canal" incident in the United States is one example that captured the public's attention in the T.V news broadcasts with the horrifying imagines of exposed leaking barrels of toxic liquid, followed by extensive coverage in newspapers with dramatic editorials, and dramatic personal interviews of the suffering victims. The media focus created a public outcry on a national level that pressured President Carter in 1980 to allocate funds for the immediate remediation of the site and relocation of its inhabitants. Soon after, Congress passed legislation known as the "Superfund" to provide funding to aid in prompt remediation efforts at other hazardous sites throughout the United States.

Another example is when German's were awakened to the fact that an environmental crisis can have significant cross-border implications when the radioactive fallout from the disastrous Chernobyl accident in the former Soviet Union not only contaminated urban and agriculture land in the Soviet Union, but throughout much of Europe. This environmental disaster empowered domestic environmental interest within the German government that brought about a change in nuclear power policy and other areas related to pollution control [1]. This paper does not examine the issue of radioactive

contamination because soil contamination legislation in each of the three countries does not include it, but it had significant impact on the German psyche on the borderless nature of pollution, and has influenced its pollution prevention policies. The Seveso chemical accident in Italy that released 3,000 kg of toxic chemicals, including dioxin, and 2,4,5 trichlorohphenol into the air, and then settled into the soil a fair distance from the factory, brought about new strict regulations and directives instituted in the 1980 Accident Hazards of Industrial Activities Ordinance (Storfall-Verordnung). It requires safety analysis, safety reports, and administrative planning to prevent similar future major accidents [2].

The final example comes from Japan in 1975. The discovery of a large amount of Hexavalent Chromium at a former factory in the City of Tokyo alarmed the public about urban soil contamination, and raised its awareness about the dangers of hazardous materials. Hexavalent Chromium is a carcinogen known to affect the liver, kidneys and the respiratory tract. Its discovery sparked a powerful demand by local citizens for a law to regulate urban soil pollution [3]. Thirty years after citizens demanded protection measures, the Tokyo Metropolitan Government (TMG) passed a soil contamination law in October 2001. This was two years before the national Soil Contamination Countermeasures Law (SCCL) was promulgated [4] by the national government. Even though TMG's response to citizen's demands was slow, it provides strong evidence that local governments have the power to make changes if they desire.

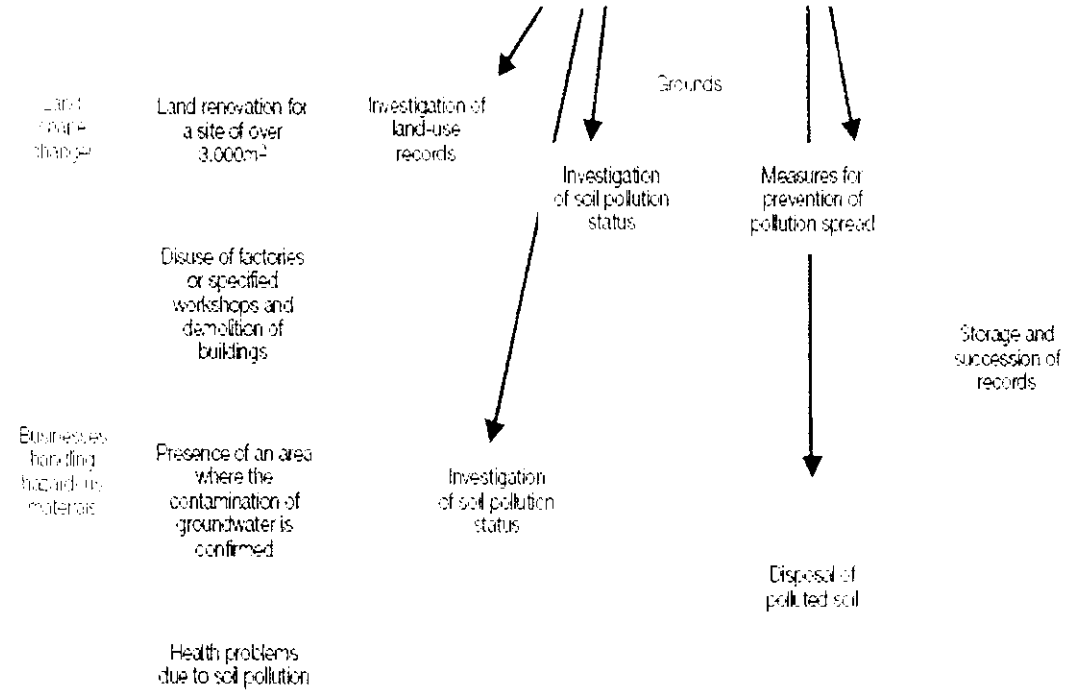

Figure 2.1: Tokyo Metropolitan Ordinance on Environmental Preservation Soil Contamination Regulation

(Tokyo Metropolitan Government homepage: http: www.metro.tokyo.jp)

The following examples illustrate how knowledge whether past or present provides no benefit unless there is government leadership to initiate change. Lucy Deane was a factory inspector in the United Kingdom in 1898 and in her report to the Chief Inspector, she wrote, "The evil effects of asbestos dust have also instigated a microscopic examination of the mineral dust by HM (Her Majesty) Medical Inspector. Clearly revealed was the sharp glass-like jagged nature of the particles, and where they are allowed to rise and to remain suspended in the air of a room in any quantity, the effects have been found to be injurious as might have been expected" [5]. The U.S. passed the Asbestos School Hazard Detection and Control Act in 1980, and later passed the Asbestos Hazard Emergency Response Act of 1986. In Germany, there is no specific law, and in Japan, amendments were made to the Waste Management and Public Cleansing Law on July 26, 2006. Furthermore, the precautionary principle has been ignored many times, three in particular which are significant involve: Poly Chlorinated Biphenyl (PCBs) which was used in a variety of ways such as an industrial coolant, Benzene formally an additive for gasoline, and Tributyltin (TBT) antifoulants that were applied to ship hulls to retard barnacle

growth. Scientists knew about the carcinogenic nature of these chemicals many years before governments finally banned them. The author argues that the denying the present risks that have been revealed from past soil contamination cases will some day bring costly consequences to national, state and local governments, companies, and citizens if a proper preventive environmental risk management system is not established. A few major metropolitan governments in Japan have taken preventive measures to soil contamination, but the model proposed in this dissertation provides an affordable organizational modification for small and medium-sized local governments to reduce future risks. Before examining the different soil laws pertaining to soil contamination in the U.S., Germany and Japan, it is essential to compare the definitions of soil contamination in each country. Table 2.1 provides the basic definition according to each government's interpretation.

Table 2.1: Soil Contamination Definitions for the United States, Germany and Japan
(By Author)

	Soil Contamination Definition
United States	"Soil onto which available evidence indicates a hazardous substance was spilled, spread, disposed, or deposited." EPA Glossary of Terms and Acronyms Superfund. http: www.epa.gov superfund resources brstrain human glossd.htm, pp. 5
Germany	"Harmful soil changes (to the soil) within the meaning of this Act are harmful on soil functions that are able to bring about hazards, considerable disadvantages or considerable nuisances for individuals or the general public." Federal Soil Protection Act (Bundes-Bodenschutzgesetz-BBodSchG Art. 2 (3)) March 17, 1998, Federal Law Gazette 1 pp. 502.
Japan	"In this Law 'Specific Harmful Substances' mean lead, arsenic, trichloroethylene and other substances (excluding radioactive substances) which are prescribed by Cabinet Order (Appendix I) to have the fear to cause damage to human health due to their presence in soil." Soil Contamination Countermeasures Law Art. 2 Ministry of the Environment. http: www.env.go.jp en laws water soclaw ch1.html, pp. 1.

2.1.1 SOIL CONTAMINATION LAWS IN THE UNITED STATES

The United States quickly passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) into law in 1980 in response to citizens' outcries to cleanup toxic sites to protect American's health. "CERCLA is essentially a tort-like, retroactive statute designed to cleanup hazardous waste sites and respond to hazardous spills and releases of toxic waste into the environment. CERCLA is remedial rather than regulatory, and thus it focuses on remediation of past activities" [6]. The Superfund legislation funded emergency cleanup actions and was supposed to expedite remediation

construction. Initially the Superfund was meant to be a five-year, $1.6 billion trust fund with a $2 million limit for sites not listed on the National Priorities List (NPL) that were in need of short-term removal or emergency remediation. Soon after it was enacted, ambiguities in some statues led to a wide-range of judicial interpretations that forced Congress to make amendments in what became the Superfund Amendments and Reauthorization Act of 1986 (SARA). "Major changes to CERCLA included revised cleanup standards, strengthened settlement and enforcement provisions, and a larger revenue base for financing and replenishing the Superfund" [7]. The four liability clauses for responsible parties state, "All costs of removal or remedial action incurred by the federal or state government 'not inconsistent' with the National Contingency Plan must be repaid" [8]. With regard to penalties, an administrative offence is set at a maximum ten thousand dollars, a one-year prison term, or both. Figure 2.2 illustrates the process for Remedial Investigation (RI), and Feasibility Study (FS) that decided the appropriate response for a particular site. Table 2.2 shows the number of sites that have been put on the NPL and deleted since 1992. Appendix III provides a detailed map of all Superfund sites including the ones that have finished remediation construction and ones presently identified or undergoing clean up operations.

The Superfund employees the Hazardous Ranking System (HRS) to calculate the potential threat of the toxins in the soil to determine if they pose a health or safety problem or damage to the environment. Factor values obtained from the Superfund Chemical Data Matrix (SCDM) evaluate the necessity for the site to be listed on the NPL. If a site scores 28.50 or greater out of 100, it is eligible for the NPL [9]. The most current list of chemicals on the HRS appears in Appendix I. "Benchmarks are environment, or health-based substance concentration limits developed by or used in other EPA regulatory programs. SCDM contains HRS factor values and benchmark values for hazardous substances that are frequently found at sites evaluated using the HRS, as well as the physical, chemical, and radiological data used to calculate those values" [10]. Site inspectors that use "Quickscore", which is a software program developed by the Office of Superfund Remediation and Technology Innovation, can simplify the task of calculating the following three main factors in the HRS [11]:

1) "likelihood that a site has released or has the potential to release hazardous substances into the environment.
2) characteristics of the waste (e.g. toxicity and waste quantity
3) People or sensitive environments (targets) affected by the release" [12].

The HRS scores the following four pathways: groundwater migration, surface water migration, soil exposure, and air migration. One or more scores are combined using a root-mean-square formula as shown in figure 2.3 to determine the overall score [13].

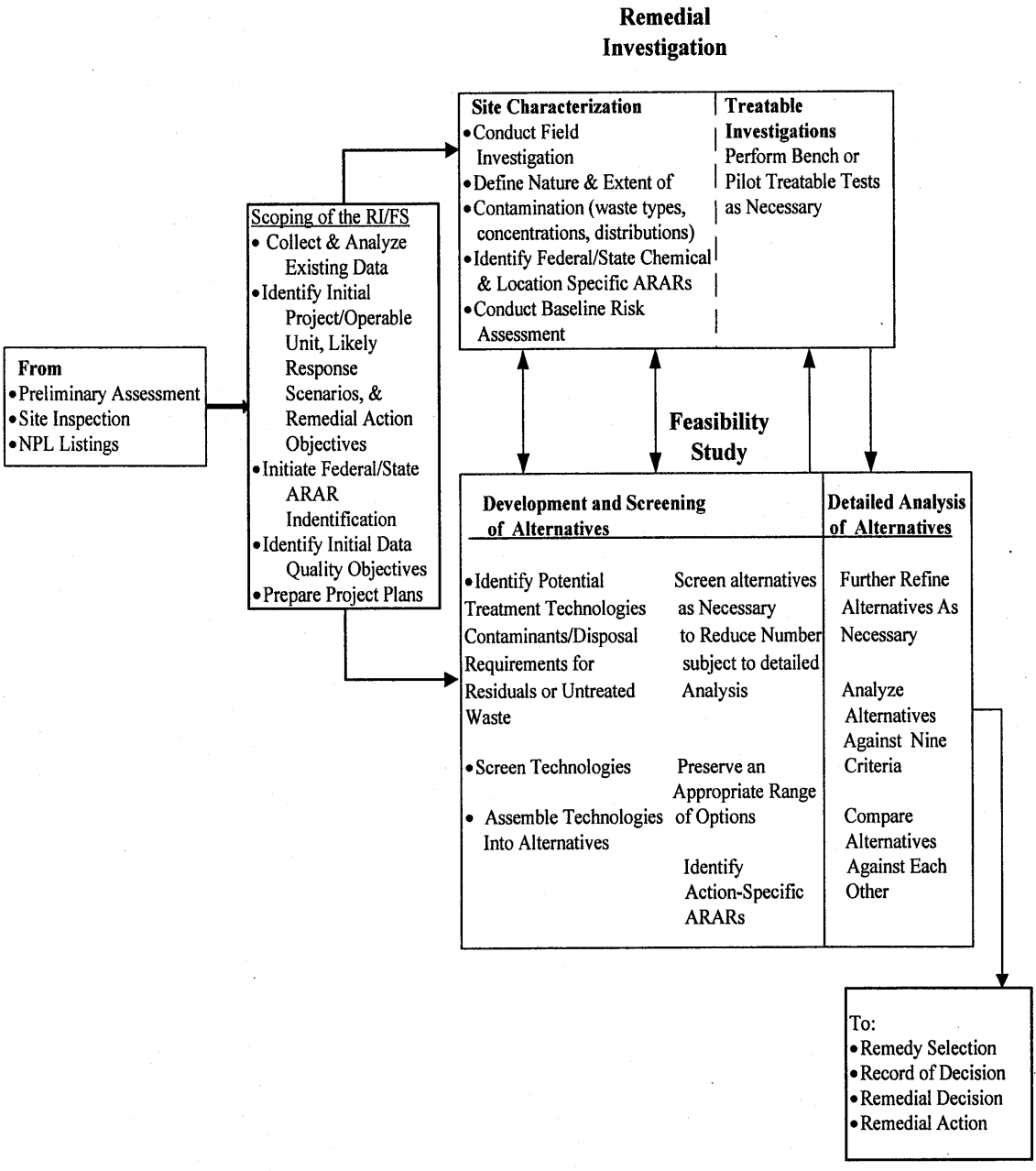

Figure 2.2: United States Environmental Protection Agency's (EPA) Remedial Investigation and Feasibility Study Flow Chart

(EPA Homepage:http://www.epa.gov)

$$S = \sqrt{\frac{S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2}{4}}$$

where S_{gw} = ground water migration pathway score
S_{sw} = surface water migration pathway score
S_s = soil exposure pathway score
S_a = air migration pathway score.

Figure 2.3: HRS root-mean-square formula to determine if a site is eligible for the NPL. (http://www.epa.gov/superfund/sites/npl/hrsres/hrsgm/ch3.pdf)

Table 2.2: Number of NPL Site Actions and Milestones by Fiscal Year
(EPA Annual Report on Superfund Sites, 2005)

Action	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Sites Proposed to the NPL	30	52	36	9	27	20	34	37	40	45	9	14	26	12	0
Sites Finalized on the NPL	0	33	43	31	13	18	17	43	39	29	19	20	11	18	0
Sites Deleted from the NPL	2	12	13	25	34	32	20	23	19	30	17	9	16	18	1
Milestone	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Partial Deletions*	-	-	-	-	0	6	7	3	5	4	7	7	7	5	2
Construction Completions	88	68	61	68	64	88	87	85	87	47	42	40	40	40	9

A fiscal year is October 1 through September 30.

Fiscal year 2006 includes actions and milestones achieved from October 1, 2005 to the present.

Partial deletion totals are not applicable until fiscal year 1996, when the policy was first implemented.

* These totals represent the total number of partial deletions by fiscal year and may include multiple partial deletions at a site. Currently, there are 54 partial deletions at 44 sites.

2.1.2 SOIL CONTAMINATION LAWS IN GERMANY

The Federal Soil Protection Act in Germany that was enacted in 1998, has fewer clauses and appears less complex than CERCLA in the U.S., but since the protection of environment falls under the Basic Law as indicated by Article 2 paragraph 2 GG, and Article 14 GG, a situation exists where disputes are weighed against other legitimate public or private interests; thus, making it more multifaceted than it appears [14]. Further complicating matters is that all EU adopted regulations take precedence over member state's national laws. However, the subsidiary principle provides member states with plenty of leeway to draft and pursue national environmental programs [15].

The three basic principles behind German law are:

1) The *precautionary principle* that states environmental pollution should be avoided before it is released. This includes regulations to increase protective measures, and action to keep pollution to a minimum.
2) The *polluter pays principle*. This is a market-based economic tool to stimulate innovative techniques for polluters to reduce their costs. It requires anyone responsible for endangering, polluting or causing damage to will be liable for remediation or other related costs.
3) The *principle of cooperation*. The government develops its environmental policies in consultation with all social groups to prevent future damage and clean-up any past damage. Voluntary agreements should take priority over laws and regulations [16].

These principles affect all environmental laws including the Federal Soil Protection Act that declares; "the purpose of this Act is to protect or restore the functions of the soil on a permanent sustainable basis. These actions shall include prevention of harmful soil changes, rehabilitation of the soil, of contaminated sites and of waters contaminated by such sites; and precautions against negative soil impacts" (Art.1) [17]. There are two definitions classifying contaminated sites.

1) This act defines closed-down waste management installations as former waste-disposal sites.
2) Closed-down plants that handled hazardous materials are industrial sites.

The Basic Law requires the Länder to record, estimate the risk, and remediate the contaminated sites. This law does not cover polluters if the land was transferred before March 1, 1999 because the law is not retroactive like CERCLA. The following outlines the liable parties under the law:

- The polluter
- The legal successor of the polluter
- The operator
- The owner
- A former owner, if she/he transferred the property after March 1, 1999; or
- The person/entity responsible under the general principles of commercial or corporate law for the

legal entity owning the site [18].

The penalty for committing an administrative offence is up to 100,000 DM and for other offences 20,000 DM. Details on the pathways and the type of contaminate along with their action, trigger, precautionary values requiring remediation action are listed in Appendix I.

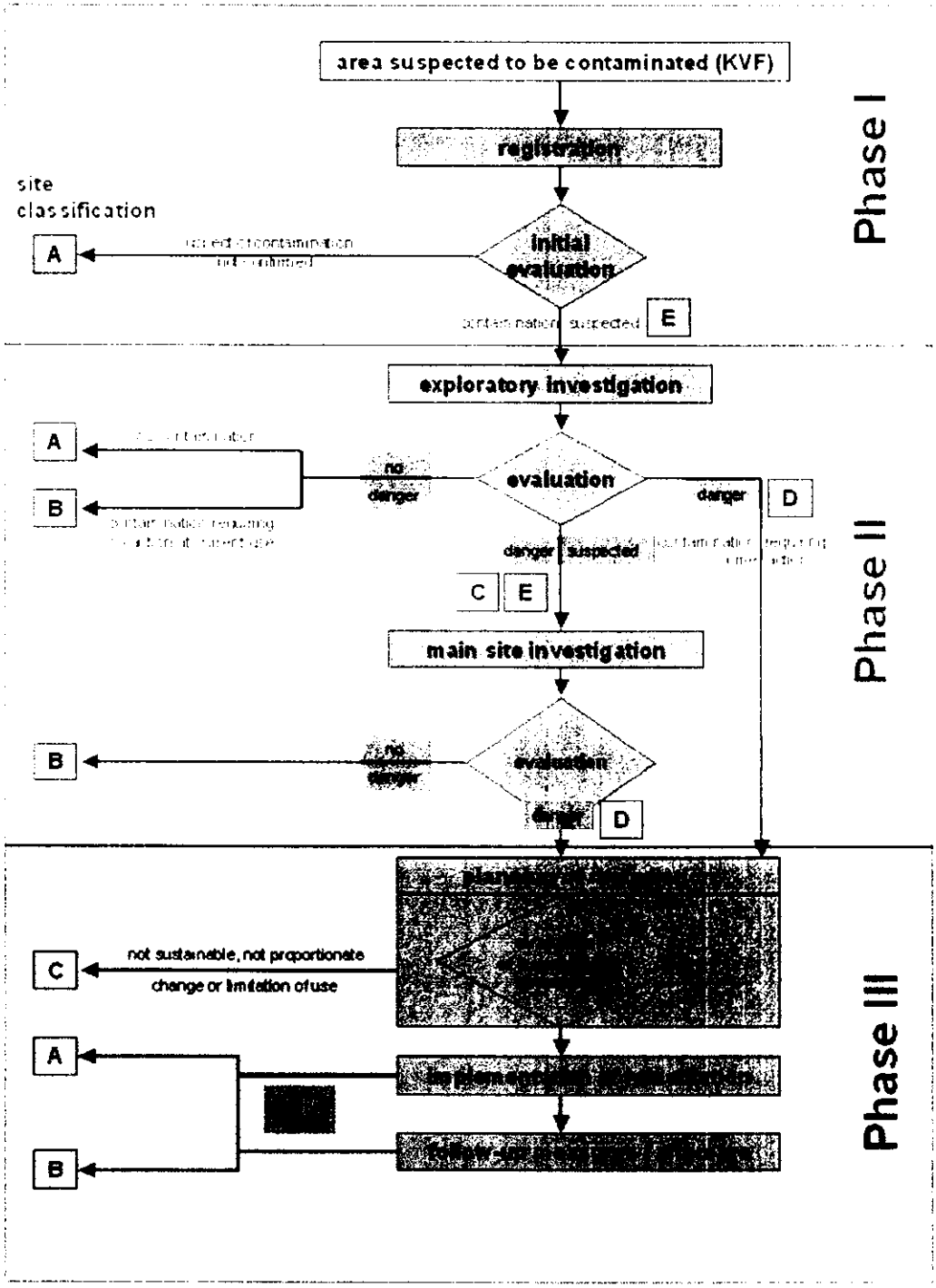

Figure 2.4: Process for Suspected Soil Contamination in Germany (http://www.portalu.de)

2.1.3 SOIL CONTAMINATION LAWS IN JAPAN

The Soil Contamination Countermeasures Law (SCCL) that was put into force in February 2003 is meant to protect human health from soil contamination, and require owners, administrators, or occupiers to take necessary measures (including the removal of the contamination or preventing the spread of contamination) [19]. This new law covers 25 hazardous substances. It includes ten heavy metals, ten volatile compounds, and five agricultural chemicals listed in Appendix I. This law was modeled after CERCLA in the U.S. in that it requires "the owners, administrators or occupiers, (Collectively called 'owners') to take necessary measures (including the removal of the contamination or prevention of its spreading) to prevent damage to human health" [20]. The owner; however, has the right to file a claim to reclaim all incurred costs against the polluter. The law requires a company that owns potentially contaminated land to conduct an investigation at its own expense if either of the following two conditions exists:

1) When a business that handles toxic or hazardous waste, demolishes or removes a building(s), or ceases their business (Article 3: Mandatory Investigation).
2) If a prefecture governor determines that there is a threat to human health (Article 4: Investigation Order) [21]. The investigation is performed by a person designated by the Minister of Environment according to methods prescribed by the Order of the Ministry of Environment; after which, the results are sent to the prefecture governor. If contamination is found to exceed the levels prescribed by the Ministry of Environment Ordinances (Appendix I), the governor is then required to register the site as a "Designated Area" which is open to public inspection. The governor then orders the owner to prevent any further damage, prevent the contamination from spreading, and to remove the contamination, all within reasonable time.

A majority of the responsibility to fulfill the requirements of the SCCL is placed on the prefecture governor, but local governments may be involved in the process in three ways:

1) The prefecture governor may ask the head of the related local governing body to cooperate in sending the necessary documents, and supply opinions on how to prevent health problems related to the toxic substances found in the soil. (SCCL Article 31)
2) Local governments shall try to educate the public about the inherit health dangers that are related to soil contamination by the government designated harmful substances. (SCCL Article 35 [1])
3) Local governments shall work towards developing necessary plans to achieve public education goals. (SCCL Article 35 [2])

The law requires that any person wanting to alter or remove soil from a designated site report to the

prefecture governor at least 14 days before conducting such work. If an offender ignores this requirement, they will be assessed a fine not exceeding 200,000 yen. An owner who violates orders to conduct a soil contamination investigation, or refuses to remediate or contain pollution, will face a one million yen fine or a prison sentence not exceeding one-year. Figure 2.5 below outlines the process.

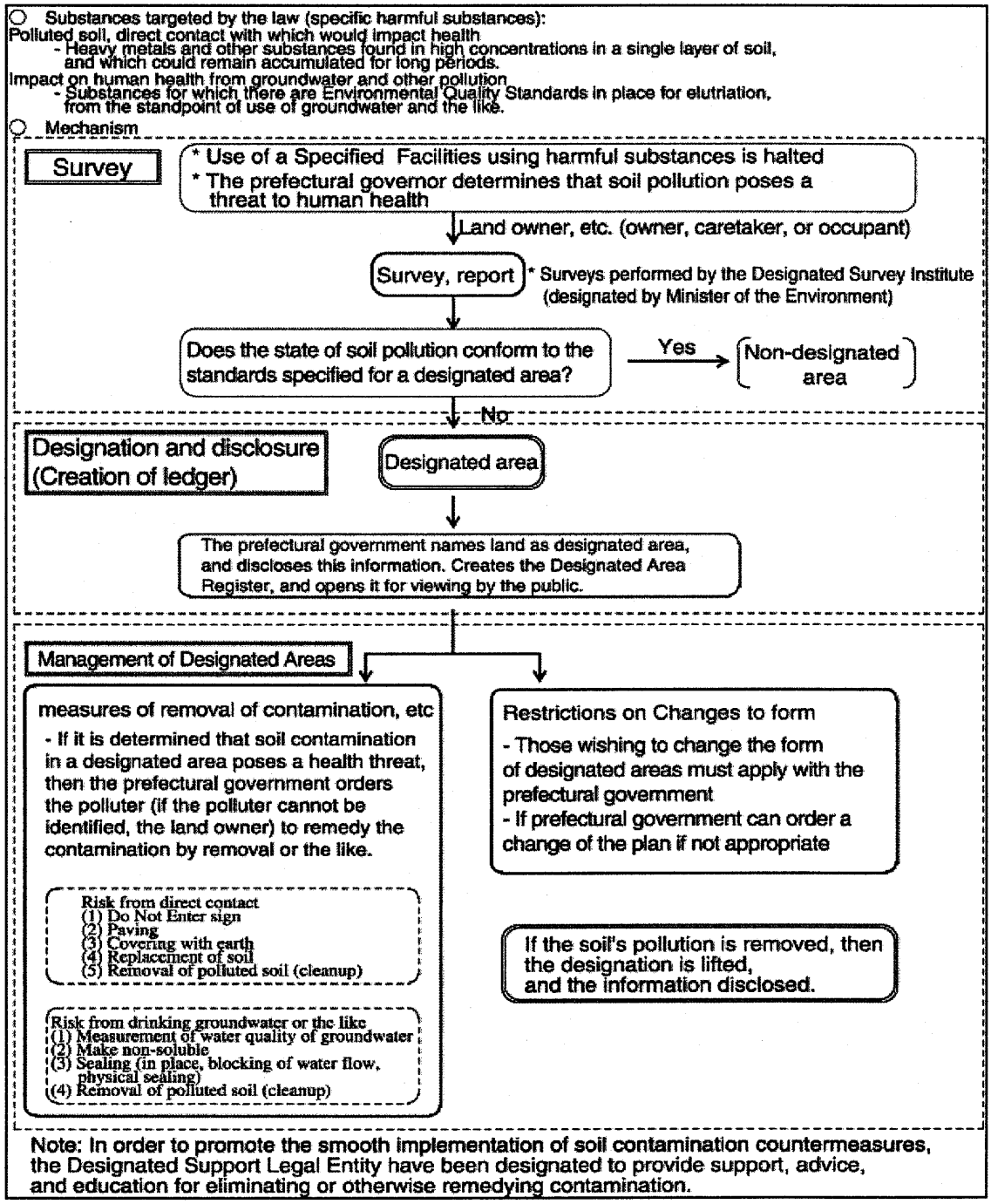

Figure 2.5: Flow chart of Soil Contamination Countermeasures Law in Japan (MOE, 2003 White Paper of the Environment)

This dissertation's model deals with urban soil contamination, but Japan's other soil contamination law deserves mention because urban expansion to rural areas continues to increase as people move to less populated areas. The Agriculture Land Soil Pollution Prevention Law enacted in 1970 "aims at the prevention of the production of agricultural crops and livestock which are feared to be harmful to human health or the prevention of the obstacle of the growth of agricultural crops and others to be helpful for the protection of national health or the preservation of a good living environment, by establishment of necessary policies which are useful for the prevention of agricultural land soil pollution caused by specific harmful substances. . ." [22].

2.2 CONVERGENCE AND DIVERGENCE OF ENVIRONMENTAL POLICIES FOR SOIL CONTAMINATION IN THE UNITED STATES, GERMANY, AND JAPAN

The increasing public health concerns from the serious air, water and noise pollution in urban areas brought about by the exploding industrial growth in each country at the end of the 60s and the beginning of the 1970s brought the environment to the forefront of major new national policy changes in each of these countries. Japan and Germany share the distinction of having very densely populated urban areas and rapid redevelopment after the war that intensified the pollution problems.

The United States enacted its greatest number of environmental laws in a short period in the early 1970s. It was also the beginning of the age of independent environmental non-profit and non-government organizations (NPOs/NGOs). Friends of the Earth was established in 1969, the National Resource Defense Council in 1970, and Greenpeace in 1971. Public opinion about the environment caught President Nixon's attention and the Congress members as well. From 1938 to 1969, only six environmental laws had been passed, but from 1970 to 1973, eight laws, including three major laws were enacted. The National Environmental Policy Act, Resource Recovery Act, and The Endangered Species Act; and during this period the Environmental Protection Agency (EPA) was established to manage these new environmental regulations.

Germany was experiencing an environmental revolution of it own at the same time. Dr. G. Dietrich Feldhaus, who was involved in early air pollution policy, stated that in the early 70s, policy change did not result from political discussions in Germany, but by President Nixon's sudden interest in environmental protection [23]. Germany passed its Federal Environmental law in 1971 following the three basic principles mentioned earlier in the legal background section. Several important laws that were enacted during this period included the Waste Removal Act (1972), the Leaded Petrol Act (1972), and the Federal Emissions Control Act (1974).

Japan passed its Basic Law for Environmental Pollution Control in 1967 that included unique policies.

These included pollution-monitoring, developments of science and technology for pollution control, the establishment of national quality standards for air, water and soil pollution, but the efforts were not strong enough to protect citizens' health. Frustrated citizens created grassroots organizations to protest against a national government that was doing little to redress victims suffering from the mercury poisoning cases in Minamata and Niigata, the asthma epidemic in Yokkaichi, and illnesses from cadmium waste, known as *itai-itai* syndrome in Toyama prefecture. "According to one estimate, by the early 1970s, about 1,500 to 3,000 citizens' groups had organized to protest against industrial pollution" [24]. The government responded by passing 14 major anti-pollution bills and amendments in 1970. Out of the 14 bills the following six laws have since changed in name or been incorporated into another law [25]:

1) Water Pollution Law
2) Law Relating to the Prevention of Marine Pollution and Maritime Disaster
3) Law Pertaining to Soil Pollution in Arable Land
4) Law Concerning Entrepreneurs' Baring the Cost of Public Pollution Control Work
5) Law for Punishment of Environmental Pollution Crimes Related to Human Health.
6) Partial Revision of the Basic Law for Environmental Pollution

The national government established the Environment Agency in 1971, and even though it was not very influential among the government agencies, the new laws and the new agency were meant to show the citizen groups that the government cared.

Similar trends worldwide and in each of the before mentioned countries signaled a new direction in environmental policy. Nevertheless, the oil shock in 1973 quickly dampened Germany and Japan's interest in the environment. Both of these countries relied heavily on Middle East oil and the serious economic impact forced both the German and Japanese governments to focus more on their economies and less on the environment. The United States experienced some economic hardship, so the government made some amendments to loosened emission standards required for automobiles by the Clean Air Act, but the economy did not enter into a serious recession like the one Japan and Germany experienced. This proved to be a significant catalyst for the divergence in environmental policy that continues to this day.

The 1980s brought a virtual environmental stalemate in the United States. President Reagan believed that his landslide victory was a mandate by voters to cut government red tape, and to reduce the federal government's control of the economic measures by reviving the American free market system. His deregulation policies weakened many of the laws passed in the 70s. It is ironic that the government actually strengthened the often-criticized CERCLA program with its strict liability clauses and strict

government controls by the SARA amendments during his presidency. However, non-profit organizations often criticized Reagan's attack on the environment. In fact, they became financially richer and members increased, but the politically divided Congress and the president's free market economic stimulus program during the 1980s, resulted in a disappointing period for U.S. environmentalists.

Quite a different movement came out of Germany during the 1980s. The Green Party gained significant power and put Germany's focus back on the environment, but with a different approach from the 1970s. The third objective in the 1971 Federal government's environmental policy that states removing damage and detriment to the environment by human intervention came more forcefully to the forefront of German policy [26]. The 1986 Chernobyl nuclear power plant and Seveso chemical accidents heightened public awareness about the importance of prevention, and the potential global impacts that major accidents produce.

Japan's environmental movement went almost unnoticed during the stable economic growth during the 1980s. People were breathing easier because air pollution standards for sulfur oxide (SO_x) were nearly achieved, noise pollution had decreased and there were fewer reports about the environment by the media. According to public polls conducted by the Ministry of Environment, most Japanese thought the environment was in good condition. Many researchers dealing with Japan blame the lack of environmental improvements to the fact that NPOs were too weak, and they did not have enough funds to lobby for new legislation [27], but the lack of media and public interest to put political pressure on the government contributed as well.

In the 1990s, George H.W. Bush tried to bring back some environmental leadership to the government after taking office. He submitted amendments to the Clean Air Act to reduce sulfur dioxide emissions, and managed to break the gridlock that had prevented its earlier passage. However, he continued the Reagan policy to focus limited involvement in international agreements, and focus on domestic environmental issues.

Environmentalists' had high expectations when the Clinton administration took over in 1994, because both he and Vice President Gore were strong supporters of international and domestic environmental protection. In spite of this, the Republican controlled Congress prevented the Clinton administration from enacting any significant new legislation. In 1995, the special environmental tax imposed on oil that funded the Superfund expired. President Clinton could not get the Republican controlled Congress to continue the program because many lawmakers saw it as a pork barrel program that had grown too fat since its inception. Since George W. Bush took office in 2000, the Superfund has dwindled to zero

funds as of 2004. The $1,241 million appropriation for 2004 must come from the general revenue fund [28].

In the 1990s, Germany continued its global approach to environmental activities and took the lead in EU environmental policy making. "The most sweeping structural changes were associated with the Red-Green coalition's introduction of ecological taxes that are meant to help lead German society in the direction of ecological modernization" [29]. The lack of communication between the Länder and the Federal government has been problematic for German environmental policy since the unification in 1990. "The lack of relevant data is a major obstacle to better integration of environmental concerns in development activities undertaken in the New Länder. There is a lack of territorially disaggregated statistics on i) environmental assets, conditions and trends, ii) economic and social pressures, and iii) policy responses" [30]. This lack of information has slowed soil remediation actions to hazardous sites, has misled the government about the future funding requirements; most significantly, it endangers citizens living on or near these sites. According to a 1999 European Environment Agency report, annual expenditures for remediation are about 70 million dollars, which is insufficient to achieve the government's goal of cleaning up the 362,689 identified sites. These data show that Germany at present is ill-equipped to handle the enormous task of cleaning up the nation, and it does not include former military bases located in the former East Germany that have serious contamination issues. The map in Appendix III pinpoints the large-scale remediation activities currently underway, whereas table 2.3 supplies more complete data on the number, type and location of sites.

Table 2.3: Soil Contaminated Sites in Germany by Location

(German Ministry of the Environment)

Baden-Württemberg	6,229	11,567	17,796
Bavaria	10,034	3,295	13,329
Berlin	763	6,220	6,983
Brandenburg	8,189	14,447	25,313
Bremen	173	18,154	18,327
Hamburg	491	1,638	2,129
Hesse	6,630	63,539	70,169
Mecklenburg Western Pomerania	4,078	7,264	11,342
Lower Saxony	8,957	50,000	58,957
North Rhine-Westphalia	18,116	17,147	35,263
Rhineland-Palatinate	[illegible]	[illegible]	[illegible]
Saarland	1,686	3,530	5,216
Saxony	8,590	19,115	27,705
Saxony-Anhalt	6,296	14,692	20,988
Schleswig-Holstein	3,181	16,451	19,632
Thuringia	6,138	12,824	18,962
Germany total	**100,129**	**259,883**	**362,689**

Finally, turning to Japan's efforts in the 1990s to the present day. The Japanese government changed from the insular policy similar to the United States: to a more a European-style, global approach. The

Kyoto Conference brought Japan international recognition it had been seeking. In order to be a serious participant on the international stage, the government realized it needed to work more closely with non-profits and provide more funds for their programs. It granted $8 million to Non Government Organizations (NGOs) in 2000 to execute global environmental conservation activities [31]. In addition, it loosened regulations for establishing a non-profit organization.

The Organization for Economic Co-operation and Development (OECD) in its 2002 report praised Japan for the progress towards improving air quality, energy efficiency and its recycling efforts. Nevertheless, the national government's efforts toward soil contamination are still behind the United States. The government has set aside only $37.9 million for this year's soil remediation budget. In addition to insufficient funds, Japan like Germany, does not have exact data on the number of contaminated sites. The graph in figure 2.6 compiled by the Ministry of the Environment (MOE) lists 349 identified sites that exceed government pollution standards out of the 700 sites surveyed in 2003 [32]. This is a significant increase of surveyed sites compared to previous years because of the promulgation of the SCCL. However, experts in the business world estimate the actual figure to be closer to 400,000 sites at an estimated $122 billion in remediation costs [33]. There is no accurate map of actual location of contaminated sites, but the one in Appendix III illustrates the approximate location of sites in Japan.

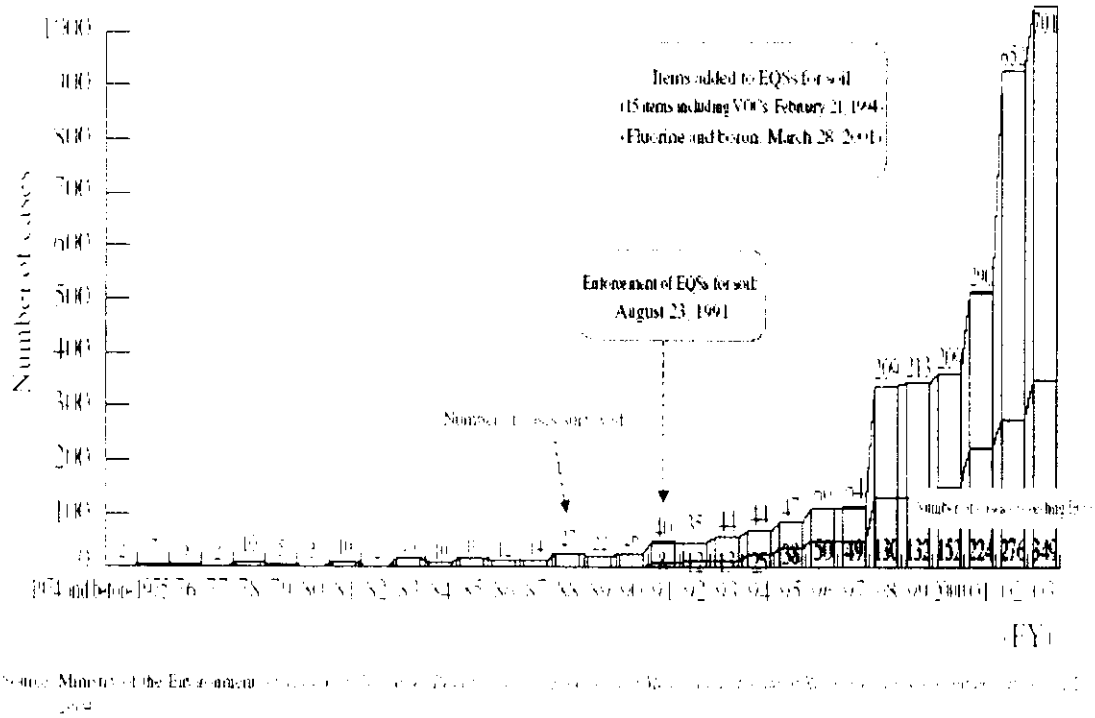

Figure 2.6: Soil Contamination Survey in Japan and the number of cases exceeding EQS (MOE, 2006 White Paper of the Environment)

The history of pollution control points to the fact that command and control (C &C) measures have been successful in reducing pollution, but market-based, non-regulatory mechanisms to reduce enforcement costs and improve flexibility in dealing with pollution issues are supplementing C&C policies. This is particularly pertinent to high high-priced soil remediation construction. The Government Accounting Office (GAO) in the U.S. has reported that the voluntary approach offers states an additional tool because of its cost effectiveness to carry out remediation at sites that would otherwise remain contaminated [34].

Table 2.4: Comparison of Soil Contamination Laws Between the U.S., Germany, and Japan (By Author)

Country	Features	Liabilities	Penalties
United States	Remedial and retroactive to past polluters, owners	Individual or shared costs for all liabilities involved in remediation. Superfund money allocated to seriously contaminated sites	$10,000 or 1 year prison term or both
Germany	Remedial and preventive. Applies only to owners after March 1, 1999	Polluter Pays Principal. Government pays if can not be identified	DM 100,000 and an additional DM 20,000 for other offences
Japan	Remedial with owner responsible with limited retroactive clause	Owners, administrators, occupiers	Violation from and not exceeding ¥1,000,000 to ¥200,000 or 1 year prison term

Table 2.5: Summarization of Drivers Behind Soil Contamination Policies

(By Author)

Effects	United States	Germany	Japan
POLICY ATTRIBUTES	Domestic oriented environmental policy	Global & regionally oriented environmental policy	Combination of global and domestic policy
NON-GOVERNMENT ORGANIZATIONS	NGOs confrontational with government & corporations	NGOs cooperate with the government to improve the environment	NGOs small and underfinanced, but locally effective
FUNDING AVAILABILITY	Politics has large impact on funding	Insufficient funds for data acquisition & remediation	Insufficient funds for data acquisition & remediation
CULTURE INFLUENCES	Individualism, Reactionary attitude, confrontational, seek financial redress	Preventive minded & co-operative attitude, public support	Group oriented Superficially stricr regulations, but implementation weak

Table 2.6: Environmental and Social Movement Chronology for the U.S., Germany, and Japan (By Author)

Year	U.S.	Germany	Japan
1960s	Economic & industrial expansion created environmental & health problems. Local governments made first environment laws.	Economic & industrial expansion created environmental & health problems.	Economic & industrial expansion created environmental & health problems.
1970s	Early 70s brought about many new C&C laws. Beginning of NPO's and NGO's organizations. President Nixon took lead in the environmental fight.	German environmental revolution begins influenced by U.S. Adopted 3 main principles. Domestic problems (acid rain)	Early 70s brought many new amendments (14). Media reports increased & citizens protested against health problems.
1980s	Superfund established. The first environmental emergency fund. President Reagan reduced government involvement. Free market policies took attention away from the environment.	The Green Party gained power causing a divergence from U.S. policy. Global scale accidents changed attitudes & policies towards preventing and removing pollution.	"Bubble economy" overshadowed environmental issues. Little government or public interest or concern.
1990s	President Clinton tried to expand to global involvement, but no political support. EPA moved away from C&C to voluntary.	Rio Summit and global issues lead policies. German unification increased environmental pressures.	Changed from domestic to global involvement. Global leadership from Kyoto Summit in late 90s.
2000s	George W. Bush loosened environmental policy enforcement and funding. Volunteer compliance dominates new program policies	Took leadership in the EU policy development. Changed from industrial to environmental country.	Lead efforts to pass the Kyoto Protocol, increased recycling efforts, introduced ozone and greenhouse gas measures, and soil contamination law enacted.

The EPA created three pilot projects that involved collaboration between the federal, state, local governments, and local communities to promote prevention and cost efficient methods. It developed the projects to determine if volunteer measures could be as effective in producing compliance and

improved environmental performance as C&C measures have been.

1) "33/50 Program".
2) "Project XL".
3) "Performance Track".

The 33/50 program established in 1991, targeted companies that reported using or releasing one or more of the seventeen chemicals in the table 2.7. The EPA set a goal of reducing the release of the targeted chemicals by 33 percent by 1992 and a 50 percent reduction by 1995 using the 1988 toxic chemical release data as the baseline. Besides demonstrating the effectiveness of voluntary projects, another goal was to advance a pollution prevention mind-set. In order to attract a large number of firms, the rules merely required a firm to fill out a form that stated the company's reduction strategies and goals. Sixty four percent from top 500 large companies participated in the program, but with only 14 percent participation rate for small and mid-sized (SMEs) enterprises [35].

Summary of the results:

- Achieved its 50 percent reduction goal a year ahead of the program's 1995 deadline.
- The largest reductions came from ozone-depleting chemicals; in addition, other chemicals reduced by 50 percent from 1988 to 1995.
- More pollution prevention activity reported by facilities for 33/50 chemicals than other Toxic Release Inventory (TRI) chemicals.
- Even a year after the 33/50 ended, reductions of targeted chemicals were higher than other TRI ones.
- More than 750 million pounds of toxic chemical emissions reduced by 1995.

Table 2.7: 33/50 Targeted Chemicals

(EPA homepage: http://www.epa.gov)

Targeted Chemicals		
Benzene	Tetrachloroethylene	Cadmium and cadmium compounds
Carbon tetrachloride	Toluene	Chromium and chromium compounds
Chloroform	1,1,1-Trichloroethane	Cyanide compounds
Dichloromethane	Trichloroethylene	Lead and lead compounds
Methyl ethyl ketone	Xylenes	Mercury and mercury compounds
Methyl isobutyl ketone		Nickel and nickel compounds

To expand their experiment on volunteer programs effectiveness, the EPA created the "Excellence and Leadership" project which was abbreviated to Project XL in March 1995 that gave states, local governments, businesses, and federal facilities the opportunity to develop innovative strategies in reducing costs and protecting the public's health. The project was limited to 50 pilot projects, and it reached that number in 2001. Acceptance into the program was more difficult because its design was more complex and challenging than the 33/50 project. There were seven main functions [36]:

1) Regulations
2) Permit Reform
3) Environmental Information Management
4) Enforcement and Compliance Assurance
5) Environmental Stewardship
6) Stakeholder Involvement
7) Culture Change

The EPA established Performance Track to motivate and reward facilities to meet the legal environmental regulations and continually work on improving their environmental performance. Any size firm, public or private could apply for the program and if it met the requirements, it remained a member for three years, and as long as it met the requirements, it could reapply for membership. The criteria were: 1) The applicant must have an EMS in place for one complete three year cycle; 2) it must have a good record of compliance with EPA regulations and have a comment to continue complying; 3) it must demonstrate environmental improvements from the previous year and commit to four qualitative goals towards environmental performance: a) upstream improvements; b) downstream improvements; c) on-site improvements; d) achieve commitments within the three year membership period [37].

Each of these projects produced benefits not only to the environment, but also to businesses and the community of participating organizations. In addition to nationally sponsored projects, this dissertation will detail how local governments can create similar programs. The author favors the approach taken in the 33/50 project because of its simplicity to attain the desired goal. Motivation to join it centered on reducing costs through improved disposal and transfer systems, reduced liabilities due to non-compliance, damage to the environment, or to citizens health. A proactive approach helped change organizations attitudes from end-of-pipe only solutions, to a preventive one. However, these were only projects; whereas, the author believes that long-term program with audits and management reviews to monitor effectiveness are required to improve the environment.

Participants in Project XL also produced positive results, but this type of project is not suitable for a majority of small and midsize organizations because it relied on a complex set of demanding

requirements. The city of Seattle has incorporated the basic idea from the Performance Track program for it EnviroStars program and is proving successful in improving environmental performance by local firms. The author recognizes the positive aspects of both the EPA and Seattle programs, but thinks that the motivating factors for static firms to participate is too low. Welsh, Rana and Mori [38] found that firms in Japan and the U.S. that were not concerned about improving their environmental performance were less likely to adopt an environmental management system (EMS). The significant "boosters" introduced by the author in Chapter Four address this weakness, and assert that the author's system will motivate even environmentally static organizations to establish soil contamination prevention measures.

Table 2.8: Major Environmental Laws in the United States

(EPA homepage: http://www.epa.gov)

U.S. Laws	Purpose	Comments
National Environmental Policy Act (NEPA)	Encourages harmony between humankind and nature to prevent and eliminate damage	Task Force to improve management efficiency.
Clean Air Act (CAA)	Regulates air emissions	Prevention and financial support to states and local governments.
Clean Water Act (CWA)	Regulates discharges of pollutants, sets water quality standards and finances water pollution control programs	Shift strategy from a specific to a holistic approach.
Comprehensive(CERCLA) Environmental Response, Compensation, and Liability Act	Removal of contaminated soil where prompt response is necessary. Long-term action to reduce dangers. -NPL	Responsible remediation at 966 sites (62% of total sites (2005). Funding problems
Emergency Planning & Community Right-to-Know Act (EPCA)	To help local communities protect public health, safety, and the environment from chemical hazards	Bhopal accident triggered Act to report emergency planning, release & storage
Federal Insecticide, Fungicide & Rodenticide Act (FIFRA)	Provides federal control of pesticide distribution and sale.	Stipulates labels must be understandable by layperson
Oil Pollution Act (OPA)	Requires polluters to pay for oil releases	Tax on oil trust fund pays for clean up of orphan sites
Pollution Prevention Act (PPA)	Encourages industry, government, and public to reduce pollution through source reduction	Millions of tons of pollution, costs tens of billions$/yr.
Resource Conservation & Recovery Act (RCRA)	Gives EPA control over hazardous waste from "cradle-to-grave"	EPA's inflexibility inefficient & not practical solutions.
Toxic Substances Control Act (TSCA)	Supplies data on chemical substances & regulates ones that pose unreasonable danger	Politically charged and difficult to manage in a timely manner

Table 2.9 Major Environmental Laws in Germany

(German Environmental Law, Mulloy, Máire; Albrecht, Eike; Häntsch, Tanja)

German Laws	Purpose	Comments
Basic Law for the Federal Republic of Germany	Covers all the basic human rights. Environmental protection is just another objective of public policy	Follow the 3 main principles: prevention, cooperation, polluter pays. However, no overarching environmental code.
Environmental Impact Assessment Act	Insure that new projects undertaken guarantee environmental protection and the same is true for alterations to existing structures.	Has helped to make environmental law more consistent in lieu of a national environmental policy (precaution principle)
Environmental Liability Act	To award damages to parties those have suffered damages as a result of emissions.	Only applies to installations considered dangerous or have special licenses.
Federal Immisions Control Act (*Most important environmental law for investors.)	To protect human health and property from hazardous emissions through restrictions.	Licensing approval varies, recently EMAS audited companies face fewer barriers to receive a license.
Chemicals Act	Focus on material controls to protect human life and the environment from hazardous substances.	This act makes risks noticeable, preventable, and avoidable by its restrictive nature.
Waste Management Act (abbreviated name)	Conserve natural resources by reducing waste and landfilled material.	Shift from controlled waste to active waste prevention at the source.
Federal Soil Protection Act	Pertains to contaminated sites and remediation.	Polluter pays principle is the focus of this act.
Environmental Information Act	Public rights to have access to public environmental data.	Increases transparency, and improves public's awareness
Biotechnology Act	Protect against use of GMOs and other such products	Companies dealing in this field must get licenses.

Table 2.10: Major Environmental Laws in Japan

(MOE homepage: http://www.env.go.jp/en)

Japanese Laws	Purpose	Comments
Basic Environmental Law	Conservation; responsibility by all in society including national, local governments, industry and citizens.	Top-down approach which seems to promote local power, but with centralized power.
Environmental Impact Assessment Law	To ensure that a proposed project undergo an assessment to determine its impact on the environment.	Environmentalists claim assessments for government projects are biased toward business.
Law for Enhancing Motivation on Environmental Conservation and Promoting Environmental Education	To increase corporations, citizens and other organizations awareness to conservation.	Voluntary law left up to prefectures and local governments.
Law on Special Measures Concerning Removal of Environmental Problems Caused by Specified Industrial Wastes	MOE developed the policy to remove environmental problems by illegally dumped industry waste.	Prefectures and local governments receive partial funding from the national government for clean up
Waste Management and Public Cleansing Law	To restrict waste, sort, collection, disposal and recycling to protect human health and the environment.	Recycling efforts have increased and MSW has decreased slightly
Air Pollution Control Law	Voluntary and controls for air pollutants for car exhaust, and demolition of buildings.	CO_2 Emissions from all sources except industrial processes has increased (MOE 2005) from 1999.
Water Pollution Control Law	Regulates effluent from factories and businesses into public waterways	Effluents from industry have decreased, but an increase from storm water effluents and domestic sources.
Soil Contamination Countermeasures Law	Protect citizens' health by cleaning up contaminated sites.	Limited application reduces its effectiveness
Law Concerning Special Measures against Dioxins	Prevention and removal of dioxins from the environment	Has reduced dioxins greatly since passed into law.
Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances	A reporting system for chemical releases and handling procedures required of certain facilities using or manufacturing specific chemicals	Loopholes for reporting pose reliability problems and usefulness.

2.3 A COLLABORATIVE ENVIRONMENTAL RISK MANAGEMENT TEMPLATE FOR THE PREVENTION OF SOIL CONTAMINATION

Figure 2.7 illustrates the basic outline for the Collaborative Environmental Risk Management (CERM) system that this research proposes. The double-ended arrows indicate the mutual feedback that is necessary to take place in order for the model to be successful. This thesis examines the past and present state of the relationships between local governments, corporations, and local communities, and introduces a model that will improve the linkage between them. The relationships between other groups such as non-profit organizations (NPOs), non-government organizations (NGOs) and the federal government also play a role in this triad, but the focus is on the importance of strong leadership by local governments towards preventing soil contamination to ensure citizens health and reduce risks associated with soil contamination.

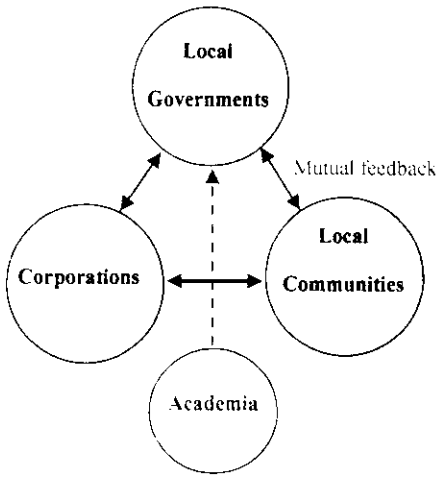

Figure 2.7: Template of the Collaborative Environmental Risk Management (CERM) Scheme for the Prevention of Soil Contamination
(By Author)

Collaboration can have negative overtones, but in this research, it has a positive tone that provides an effective utilization of a wide array of organizations' and individuals' human resources and tacit knowledge. Linden provides a good definition of collaboration [39]: "Collaboration occurs when various groups with different interests try to work together to formulate a policy or resolve an issue." The most important reason for local governments to collaborate is to provide the best environmental risk management system at a reasonable cost. Governments of any size are facing budget cutbacks, and this is particularly true for all Japanese local governments. Because of the financial hardships, an increasing number of small and medium-sized local governments (SMLGs) are merging with surrounding cities or townships to improve their economy of scale. Details on the organizational benefits derived by the author's negative and positive "booster" scheme that motivates an organization

to enter into a collaborative arrangement are explained in Chapter Four.

2.4 CONCLUSIONS

This chapter uncovered the divergent shift of environmental policies from the early 1960s to the present that reflect each of the countries economic and sustainability goals. The thesis examines EPA's modified policy from strict enforcement to non-regulatory measures that incorporates collaboration between the government and businesses to improve environmental performance. Germany's transformation from an industrial country to an environmental one using collaborative programs, and Japan's shift away from its past isolationist policy to a cooperative international role to prevent global warming lend support to the proposal that there is an increasing potential for collaborative programs to be adopted more in the future in Japan.

Comparing the regulations also assisted in identifying the different directions each country has taken. The U.S. has taken a more pollution specific approach to regulating than other countries presented in this paper. Germany has passed specific pollution laws like the U.S., but overall, the laws tend to be more holistic in protecting its citizens using some reactive measures, but with more attention to proactive procedures than the other nations. Japanese regulations rely on a combination of C&C and voluntary systems with more emphasis on C&C enforcement at the prefecture and local level.

The soil contamination issue is significant in each country, and is exacerbated in both Germany and Japan by the lack of accurate information on the number and location of contaminated sites. The lack of information creates three main risk factors: 1) Immediate and long-term risk to human health 2) Costly liability risks 3) Risk of new contamination. This chapter revealed that the U.S. has data that are more complete on hazardous sites than Germany and Japan, but decreasing funds to remediate them.

It is difficult to predict the exact direction future environmental policies might take, but one clear movement that seems will continue for at least the next decade is for national governments to promote more collaborative schemes on the state and local government level between business entities and citizens. Collaboration is proving to be more effective than taking an adversarial approach that has been the norm in the U.S. It is also more cost effective than enforcing C&C policies. Significant problematic areas for soil contamination in Japan are insufficient information available to the stakeholders, lack of capital, and the lack of a proactive program. The author's proposal for a collaborative environmental risk management scheme for the prevention of soil contamination briefly introduced in this chapter alleviates these current deficiencies.

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