Annex 1

Relevant Japanese Experience in Hazardous Waste Management

Annex 1 Relevant Japanese Experience in Hazardous Waste Management

1.1 Institutional and Economic Aspects

1.1.1 Environment and Growth

Japan's general experience in pollution control, and subsequently its emphasis upon recycling, as well as its specific experience with hazardous waste management, has considerable relevance for Romania, despite the difference in the two countries' economic circumstances. Indeed, many of the most fundamental lessons derive from Japan's experience in the period following the Second World War, when Japan was a newly industrializing country, facing very similar challenges to those facing developing and transition economies today.

The key events linking economic development and its environmental implications in post-war Japan have been well documented[1], the rapid industrialization in the immediate post-war years leading to massive air and water pollution problems in urban areas. During the late 1960s a number of catastrophic events resulting from unrestricted industrial growth took place, including mercury poisoning (Minamata Disease)[2], cadmium poisoning (Itai-Itai Disease) and inhalation of sulfur oxides (Yokkaichi Asthma). These generated tremendous public concern; citizens' movements, stimulated by the mass media, put pressure on elected officials to take action, and a number of important lawsuits were initiated. A national level Air Pollution Quality Control Law was introduced in 1968, and in 1970 the "Environmental Pollution Diet" established the national government's role in environmental management, the Japan Environment Agency being established in the following year. Responsibility for implementation and enforcement of standards remained with local governments.

A critical aspect of this history was, and continues to be, the leading role played by local governments, particularly the big city mayors. Prior to the 1970's virtually total responsibility for pollution control, if it existed at all, had been with local governments. In practice, however, they had typically competed with each other, providing incentives to attract industry with little attention to any environmental problems that such industries might cause. This attitude changed dramatically in the late 1960's. Local governments were placed under tremendous political pressure to clean up urban environments, and they reacted accordingly.

In practice, this pressure has been so effective that local emissions standards in Japan are invariably higher than those mandated at the national level. This unique situation is primarily achieved by voluntary agreements arrived at between local governments and the industrial enterprises operating in their area of jurisdiction.

Another critical event was the first oil shock, in the early 1970's. Heavily dependent on imported fuel, Japan immediately increased energy prices so that they reflected the true economic cost of supply. This coincided with legal requirements on the part of industry to reduce emissions, so it was convenient, since retooling was required anyway, to invest in

[1] See for example, S. Aoyama, J. Warford, K. Sakaguchi, N. Nakazawa, H. Naito (EX Corporation, Tokyo), *Japan's Experience in Urban Environmental Management*, EX Corporation, Metropolitan Environment Improvement Program, 1994, *Urban and Industrial Management in Developing Countries: Lessons from Japanese Experience* (W. Cruz, K. Takemoto, J. Warford), World Bank Economic Development Institute, 1998.
[2] See following Section 1.2. for a description of how the Minamata Disease problem was handled.

energy-efficient and clean production technologies at the same time. Such investments peaked in the mid-1970's.

With regard to industrial air pollution, the success of these and other measures is illustrated by trends in ambient air quality, with total emissions of sulfur dioxide, carbon monoxide, and suspended particulates showing substantial reductions since 1970. Industrial process changes, rather than the less effective "end of pipe" investments were the dominant cause of such improvements.

Japan had the highest rate of economic growth among the major industrialized countries between 1970 and 1990, but was able to achieve this along with a considerable reduction in the emission of industrial pollutants. As noted by Fujikura3, comparison with other OECD countries is relevant: in 1990 Japan emitted 0.5 kilograms of SO2 per $US1, 000 of GDP, while the corresponding figure for OECD countries as a group was 3.7 kilograms. One explanation for this performance is the amount of energy used: Japan's energy consumption per unit of GNP has been consistently lower than other OECD countries, the gap widening over the period 1970-1990; energy consumption per unit of production (by weight) for standard products such as paper/pulp, steel manufacturing, cement, and petrochemicals, fell on average by about 30% over the 1970-1990 period. In addition, total emissions of NOx also remained relatively constant over the period, despite a massive increase in road traffic.

The above experience suggests that Japan was quite successful – at least as far as industrial pollution and energy efficiency is concerned – in reconciling rapid economic growth with environmental protection measures. Clearly, a great deal of expertise was developed in the achievement of "win-win" policies and investments, i.e. those justified in both standard economic terms as well as in environmental terms. Indeed, Japan has been a leader in the development of clean production technologies, which combine efficiency in the use of energy and other material inputs with low emissions per unit of resource use.

Subsequently, this rapid economic growth has allowed Japan to be able to afford investment in environmental improvements of an amenity or aesthetic nature, making cities more livable but not contributing directly to economic efficiency or productivity.

1.1.2 Underlying Institutional, Social and Cultural Factors

Formal environmental management legislation, regulations and standards in Japan do not in general differ significantly from other countries. Reasons for the relatively successful performance are to be found in some of the details of the formal legal and institutional structure, but of greater importance are a number of underlying factors of an institutional and social nature, some of which are unique to Japan's culture, and others that to a greater or lesser degree may be applicable in Romania. Some of these are briefly referred to below with regard to (a) government-industry relationships and (b) other institutional and social factors.

1) Government-Industry Relationships

(1) Environmental Standards

The close interaction between government and industry is a characteristic of Japan's pollution control policy. This takes many forms. With regard to setting of

[3] R. Fujikura "Integration of Environment into Sectoral Policies", in Cruz et al, op cit.

environmental quality standards at the national level, for example, industries, often represented by industrial associations and supported by MITI, bargain strongly behind closed doors with Environment Agency and other environmental interests. However, once negotiations are complete and agreement is reached on standards, there is virtually 100% compliance with the agreed standards.

There are a number of reasons for this. One is that a step-by-step approach to setting standards is used, so that industries can foresee what measures they will have to take in future years, and are able to adjust investment plans accordingly. This is assisted by the traditionally long-term view taken by Japanese investors and thus by low real interest rates. As noted below, another reason for the high rate of compliance is the damage to public image that would result from adverse publicity.

Parallel actions take place at the local level, a result of which being the emergence of voluntary pollution control agreements which are uniquely Japanese, and an extremely important element of overall environmental performance in the country (about 2,500 such agreements were made annually during the 1970's and 1980's). Local governments negotiate with individual plants, often with the involvement of local citizens' groups, to arrive at an agreed level of emissions and other environmental safeguards. Again, with typically strict penalties for violations, there is virtually 100% compliance with these agreements, the standards of which exceed national norms.

It is noteworthy that Japan has made little use of market based instruments for pollution control, relying rather upon "command and control" or regulatory methods.

(2) Support to Industry

In addition to establishing and enforcing standards and other regulations, national and local governments also provide various forms of support to industry to enable them to improve environmental performance. The Japan Environment Corporation has been a major vehicle for providing technical and financial assistance, primarily to small and medium sized industries. Support is also given to support industrial relocation and establishment of industrial parks with collective treatment and disposal facilities. Financial support, such as low interest loans and tax relief, has been particularly important and effective for small-scale industrial operations.

(3) Energy and other Sectoral Policies

Combined with the foregoing are a number of policies that have been developed in individual sectors, many of them having important consequences for the environment, even though this may not originally have been a primary consideration. Foremost among these has been industrial energy policy, characterized in recent years by heavy emphasis upon efficiency and conservation, and encouraged by governmental provision of technical and financial assistance, and by a pricing policy designed to discourage excessive and wasteful use of energy. Similar considerations apply to water supply policy, where the emphasis upon utility price reform and control of private abstraction in the 1970's resulted in substantial efficiencies in water use and reduction in land subsidence.

Another important example is the urban transportation sector. The relative stability of total emissions of NOx over the period was achieved despite a rapid increase in road traffic. Explicit attention to the emission of pollutants in automobile design of course

contributed to this, but also of fundamental importance has been the major role played by mass transit and gasoline pricing.

2) Other Institutional and Social Factors

(1) Government Decentralization: Power and Competence of Local Governments

The national government traditionally establishes the overall legislative and regulatory framework for all domestic policies, provides financial assistance to local governments and the private sector, and assists in technology development. The mechanism of financial assistance to local governments has in practice been highly effective in furthering national policy. Local administration in Japan has for many years depended heavily upon a financing system in which the national government provides funds to compensate for local variations in revenue-raising ability. This system along with a decentralization of power has played a major role in making local government measures effective.

National-local government relations with regard to environment follow the conventional pattern, with actual implementation of pollution control, including establishment of local standards and regional pollution control plans, being entrusted to local governments. This is an essential element of the overall policy, for local governments are on the 'front line' when it comes to dealing with specific environmental incidents. The success of Japan's pollution control strategy rests heavily upon the competence and status of local government officials, which in Japan is by tradition extremely high. Indeed, while formal mechanisms indicate that the national government takes the lead in the development of strategic policies, local governments have historically been in the vanguard of environmental policy reform in Japan.

(2) Political and Economic Equality

Another critically important factor is the political equality and freedom of speech that exists in Japan. The degree of political equality in a country is often illustrated by its income distribution; Japan has one of the most equitable income distribution patterns in the world. Environmental issues are typically characterized by conflict of interest. The politically and financially powerful tend to benefit from causing environmental damage at the expense of the poor and disadvantaged, who often have no opportunity to articulate their concerns, and have little hope of government support. In many countries, local protest movements are not effective because of lack of education and awareness of the problems, and inadequate support from the media. These conditions certainly have not existed in Japan in the post-war years.

Specific developments in Japan with regard to the articulation of people's concerns for the environment, and the evolution of awareness include the establishment of democracy after the war and the growing neighborhood protest movements against pollution. Under the occupation policies in Japan, all people secured the right to vote, and farmers became independent after the liberalization of farmland. Freedom of speech encouraged grassroots protest movements which denounced industry and the government for being slow to take environmental protection measures, and which claimed compensation for damages that had been sustained. This prompted the government and industry to take a more forward-looking and preventive approach to pollution control.

(3) Universal Education

Related to the above, educational policy, particularly in technical fields, has played a key role in the development of Japan's environmental movement. Japan had already introduced universal education in the early 1900's, and had attained one of the highest average educational levels in the world by the 1950's. The Japanese people began to understand scientific aspects of pollution problems and took great interest in them. Additionally, individual scientists, sociologists, and lawyers provided intellectual and technical support to anti-pollution movements, and this made it increasingly difficult for the government to ignore the growing and well-articulated concerns. Freedom of the press introduced in the postwar years, the high standard of literacy, and nationwide environmental campaigns by the mass media have all combined to raise peoples' awareness of pollution problems and contributed greatly to the formation of public opinion with regard to their right to be protected from pollution and to live in a healthy environment.

(4) Social Pressure and Industrial Behavior

An almost uniquely Japanese characteristic is the extreme concern on the part of individuals and enterprises to avoid public criticism for anti-social behavior, particularly within their local community. This helps to explain the relative collegiality of local negotiating procedures, the emergence of voluntary agreements, and the high degree of compliance with environmental regulations. Clearly however, economic self-interest is also a factor: a “green” image is beneficial from a recruiting and marketing standpoint as well.

1.1.3 Relevance of Japanese Experience for Romania

Japan's environmental history during the period considered provides a number of relevant lessons. While some of the major environmental concerns in Japan might not be of the highest priority in Romania, issues relating to organization and management; achieving the co-operation of various interests; financing mechanisms, and reconciliation with economic objectives are common to many forms of environmental degradation. In considering the relevance of Japanese experience in specific policy areas, one may identify some policies or strategies that should be avoided, some aspects which provide lessons that can be implemented in the very near term; and others, the implementation of which will require a much longer time horizon before they become fully effective.

1) Industrial Strategy: Reconciling Environment and Growth

The period under consideration may be seen as consisting of two distinct phases. Japan’s economic development strategy in the immediate post-war years gave absolute priority to industrial growth, with little regard for its environmental consequences. It was not until the late 1960’s that environment started to become a significant priority, when the country embarked upon a major pollution control program.

With the benefit of hindsight, it may be concluded that the damage to public health and the magnitude of the subsequent clean-up costs indicate that Japan’s post-war industrialization policy was seriously flawed. Certainly one would not advocate that Romania should follow a similar "grow now, clean up later" strategy. However, one of the reasons why Japan followed this path was that there was inadequate awareness in the early years of the extent to which environmental degradation in fact threatened public health and indeed economic development. Moreover, in the intervening years, much has been learned, not least from Japan itself, about

the many policy reforms and investment strategies that satisfy both economic and environmental objectives. Pollution control technologies have also improved, and their costs fallen. In particular, reliance upon "end-of-pipe" treatment has been superseded by much more cost-effective measures involving modernization of industrial processes.

In fact, Japanese experience confirms that prevention is indeed generally better than cure, and it provides many examples, highly relevant for developing and transition economies, in which the policy of placing growth before environment would be incorrect even in narrow economic or financial terms. There remain, however, many areas in which there are significant trade-off between environmental management and other economic and social objectives; each of these will have to be determined on a case-by-case basis. Clearly, developing the capacity and incentives in both government and industry to carry out environmental impact assessments of major projects or policies and economic evaluation of environmental damage is an essential step.

Subsequent research has shown that opportunities of “win-win” policies abound throughout the whole spectrum of environmental actions, the consequence of which being that if these are taken full advantage of, there is no reason why environmental protection should be at odds with economic growth. This is true almost by definition for the long term, but it also applies to a considerable extent to shorter-term decisions.

2) Cleaner Production, Recycling, and Appropriate Technology

A number of immediately transferable lessons relate to pollution control technology. In Japan, early pollution control efforts were primarily "end-of-pipe", but there has been a consistent shift toward reliance upon industrial process changes, which are much more cost-effective and consistent with the twin objectives of economic growth and environmental protection. (Taking sulfur dioxide emissions as an example, studies have shown that between the mid 1970’s and mid 1980’s, reductions in emissions were almost entirely due to energy reduction and industrial process changes, as opposed to end of pipe treatment.)[4] Japanese experience suggests that there are many opportunities to introduce economically and financially viable process technologies that also have positive environmental impacts and which should therefore be given priority.

Other specific technical aspects of Japan's experience are also particularly relevant for Romania. These include industrial and public sector training methods; energy conservation and efficiency technologies; waste recycling, composting, incineration and heat recovery techniques; experience with sanitary landfill; hazardous waste management; procedures and techniques for monitoring and testing; use of planned estates for industrial relocation and the achievement of economies of scale in joint waste treatment facilities; land reclamation; epidemiological studies; setting environmental standards, including linking the staging of standards with the depreciation period of pollution control equipment; and river basin, land use and regional environmental planning.

Among the foregoing, recycling has recently achieved the highest profile in Japan, the 2001 Basic Law to Establish a Recycling-Based Society being applied to a wide range of materials and products, including packaging, home appliances, construction material, food and vehicles.

[4] Aoyama et al

However, at the other extreme, Japan has accumulated extensive experience, of great relevance to less wealthy countries, with low cost, traditional technologies, and demonstrated that they can provide the highest standards of service if properly managed. Japanese systems of night soil collection and treatment and household wastewater treatment with septic tanks are excellent examples. Environmental technologies should therefore be carefully assessed in terms of their economic justification, and the appropriate solution might be either traditional and labor-intensive, or modern high technology. They should not automatically assume that labor intensive methods, for example, are "second best" or of an inferior nature.

3) Financing Pollution Control

Local Government Support. Pollution control efforts in Japan have clearly been hastened by the extensive provision of low interest financing supplied by the central government to local governments for water supply and sewerage schemes, collective treatment works, and solid waste management, with the central government contribution being tailored according to local ability to pay. Combined with technical assistance, this has been an effective means of ensuring that such basic services are developed throughout the country in an equitable and non-controversial manner. Investments in air quality management however are typically the responsibility of private industry, where the case for financial support becomes more debatable.

Enterprise Level Subsidies. Financial support for pollution control investments by means of low interest government loans and tax incentives for private industry has been highly effective in Japan. Targeted primarily at small and medium-sized industries, and often accompanied by technical assistance, these incentives have both encouraged cooperation and ability to pay of industries in achieving higher emission standards.

However, while apparently successful in the Japanese context, this is not necessarily a model to be followed in all cases. In principle, such subsidies have a number of potential drawbacks; first, they are administratively cumbersome and place great demands upon the government machinery to avoid abuses; second they place a burden on the government's fiscal capacity; third, they tend to encourage inefficiency in the use of resources at the enterprise level; and fourth, it may be claimed that they are unfair, that the polluter should in fact pay the full cost of damage caused or for remedial measures. Helped by the unique government-industry relationship that prevails in the country, Japan has developed the administrative capacity to manage such a system, and its efficiency and fairness can only be judged in light of its relationship to the whole complex web of subsidies and taxes that characterize the Japanese policy of promoting industrial growth. It can also probably bear the fiscal burden of the subsidy system.

The above factors are not as prevalent in Romania, so particular care needs to be taken in instituting a subsidy program. Nevertheless there may be no alternative: one of the problems to be overcome is the inadequacy of the existing financial system. In the absence of a satisfactory rate of financial sector reform, a subsidy program, involving a specifically environmental fund and employing external or government subsidies, may be unavoidable.

4) Capacity Building at the Local Level

Some aspects of Japan's recent environmental history are of immediate relevance for Romania. Of highest priority are those examples of policies which involve no trade-offs

between economic development and environmental protection. Many of these relate to capacity building and training. Based on Japanese experience, it would appear that building up the capacity of local governments in pollution control should be an immediate priority, even though decentralization on a scale similar to that of Japan would generally be a very long term goal.

Capacity building should include measures such as training local government officials in pollution control administration, standard setting, and monitoring. Financial support for specific projects provided by central governments to local authorities should routinely be accompanied by training and other capacity building elements. Complementing such direct support to local governments, training should also be aimed at private sector interests, including the promotion of a pollution control industry and consulting services, and the establishment of technical assistance bodies. In this regard, the Japan Environment Corporation, which has played a leading role in disseminating technologies, is a model worth replicating.

5) Sectoral Policies

Often designed with no environmental objective in mind, the country-wide leverage exerted by certain sectoral policies may in fact be of critical importance in influencing environmental behavior. Developing and transition countries would do well to improve their understanding of the linkages between strategic economic and sectoral policies and the environment, the effects of which may be much greater than some explicitly environmental policies or actions. This may be illustrated with respect to energy, water supply, and transport policies.

Energy Price Reform is probably the best example of policies that meet both environmental and economic objectives. Raising prices of energy to reflect economic costs of supply has discouraged excessive use in Japan, and has stimulated conservation and technological innovation. Underpriced energy is common in developing and transition economies, Romania being a case in point, and reform in this area should be given the highest priority; it would also raise public revenues, which would be a major benefit. A similar case can be made for pricing of municipal and industrial water supplies; in addition, basic needs – extending service to those currently without it – is likely to be accelerated by a pricing system that allows investment in additional capacity to be financially viable. In the case of both energy and water, efforts should be made, not just to achieve cost recovery in terms of historical accounting costs, but to recover the full incremental costs of supply.

Transport Policy. It is noteworthy that despite the massive increase in road traffic between 1970 and 1990, total emissions of NOx remained relatively constant, while other traffic-related pollutants showed an absolute decline. This can be explained by a number of factors. The substantial decrease in emissions on a per automobile basis during the period was due primarily to stringent emission targets imposed on the automobile industry. Perhaps of more relevance for policy-makers elsewhere, however, has been the contribution of an efficient and sophisticated public transport system, combined with high gasoline prices and taxes which restrain the usage of private cars.

6) Environmental Awareness

There are a number of other lessons from Japanese experience that might usefully be considered in the Romanian context. These include promotion of environmental education and

public relations to improve awareness about environment; this should include increased emphasis on health education and the use of health specialists in pollution control policy. The mass media in Japan has been a major influence in alerting people to the importance and potential hazards of environmental degradation, and the presence of a well-informed population has been a major contributor to the improvement of the environment in the country. Development of support systems for those who have suffered as a result of environmental pollution should also be considered; involvement of those with scientific and legal expertise should be developed by the establishment of formal machinery for the redress of grievances.

7) Public Participation

Perhaps most important of all the lessons to be obtained from the Japanese experience is that public participation is indispensable to satisfactory resolution of environmental problems. This was demonstrated in the early years when citizens' movements - not formal non-governmental organizations, but spontaneous reactions to specific events - were the prime driving force underlying the rapid development of Japan's environmental policy. The government, recognizing this, now provides the opportunity for those who are or will be personally affected by environmental pollution or control measures to participate formally in the decision making process; this is exemplified by the increasing role of public hearings in environmental impact assessment procedures at both the national and local levels. Even in Japan, however, there is often inadequate representation of those citizens who will be most directly and personally affected by proposed large-scale development projects.

8) Determining Priorities: Economic Valuation

The importance of public pressure in stimulating governmental action has been a consistent theme in the evolution of Japan's environmental policy in recent years. Governmental decisions to introduce environmental regulations and standards, which normally involve massive public and private expenditures, have been made largely as a reaction to political realities, or as an immediate response to accidents. They have typically been made on a pragmatic, common sense basis. If the impacts of such expenditures are estimated at all, they are measured solely in intermediate physical terms, such as improvement in air or water quality, rather than in terms of ultimate objectives such as improvements in human health.

Measurement of benefits in economic terms is therefore rarely attempted. In the past, the obvious social consequences of pollution in Japan may have justified this approach, and in general, economic and environmental projects and policies have been consistent with each other. And of course, industrial interests have presented a major constraint to over-investment. However, improvements in environmental quality tend to increase exponentially in cost as standards rise, while the benefits of additional improvements tend to decline. .Although one should not pretend that precise estimates of the economic benefits of pollution control are possible, use of a cost-benefit framework, involving systematic consideration of engineering, epidemiological and other technical aspects, will become of increasing relevance to Japan in the future. This approach appears to be inconsistent with the “zero emissions” concept that is widely advocated in Japan today; in principle, however, the objective should not be zero emissions, but optimal emissions.

It seems fairly clear that Romania does not have the luxury to avoid careful comparison of the costs and benefits of environmental expenditures, and that they should be as rigorous as possible in this respect. The prospects for doing this effectively should not be overstated: in most cases, cost-effectiveness, paying close attention to the physical consequences of

alternative pollution control measures, will be the most that can be achieved, but even this will typically require considerable capacity-building, and a major multi-disciplinary effort, involving a variety of technical and behavioral skills.

9) Industrial Self-Reliance and the Pollution Control Manager

In order to minimize the administrative burden of monitoring and inspection, it is desirable if industry can be relied upon to act responsibly with regard to its emissions of waste. In Japan this is facilitated by a regulation requiring major industrial plants to employ pollution control managers, holders of national qualifications, who are legally responsible for the quality of emissions from their plants. In consequence of their professional and legal status, pollution control managers occupy senior positions in industry management, and are a critical element in placing the burden of responsibility on industry for day-to- day pollution control management, and in relieving public agencies of the responsibility for continual monitoring and inspection. The success of this policy is one of the most significant lessons of Japanese experience, and one that could be followed, at least for major industrial operations, reasonably quickly.

Establishment of a partnership between the public and private sectors has been shown in Japan to be an effective means of reconciling pollution abatement and economic growth objectives and in permitting such self-reliance to develop.. Industrial pollution abatement measures in Japan have always been based upon detailed discussion between industry groups and the government. The advantage of industrial associations negotiating with governments on matters such as emission standards is that in some cases it becomes politically feasible to obtain agreement on higher standards for the groups as whole, for example where competitors in different parts of the country

will all face the same standards. On the other hand the collective bargaining power of the associations is greater than that of a fragmented group, which may make it more difficult to obtain concessions on the part of industry.

10) Technical Education

An obstacle to rapid adoption of modern pollution control processes may be the shortage of technically qualified manpower to implement the new technologies. Thus, while technical assistance for specific environmental projects or problems can be provided quite easily, this will does not have much of an impact on environmental problems that exist on a widespread scale if manpower is not available to replicate its use. This requires a forward looking, longer-term approach. Japan's relative success in rapidly adjusting its industrial policy to deal with the environmental problems encountered in the 1960’s owes much to the existence of a large, highly educated, technologically advanced population, who, while they had not been trained specifically for pollution control, were readily able to adapt their training to these new needs. In general, this does not apply in the developing countries, and remedying this situation is necessary groundwork for development of long term environmental policy.

In order to form the basis for substantial improvement in environmental management countries should place high priority on technical education in general. This would facilitate a flexible response to as yet unknown technical challenges in environmental and other areas in future years. Such assistance, justified in its own right, would clearly fall within the "win-win" category of environmental interventions, i.e. being justified not simply in terms of environmental objectives, but also of more general development requirements.

1.2 Prevention and Recycling in Japan

1.2.1 Construction of Recycling-Oriented Society[5]

1) Legal Framework of 3R

Japan does not have a law specifically for hazardous waste prevention and recycling. However, in 2000 the Japanese government revised various laws and introduced new laws and acts aiming at creation of a recycling-based and resource- cyclical society. A brief outline of them will be presented here. The overall objective of the laws is to change society from "one-way consumption" to "recycling-oriented" society as shown in the following figure.

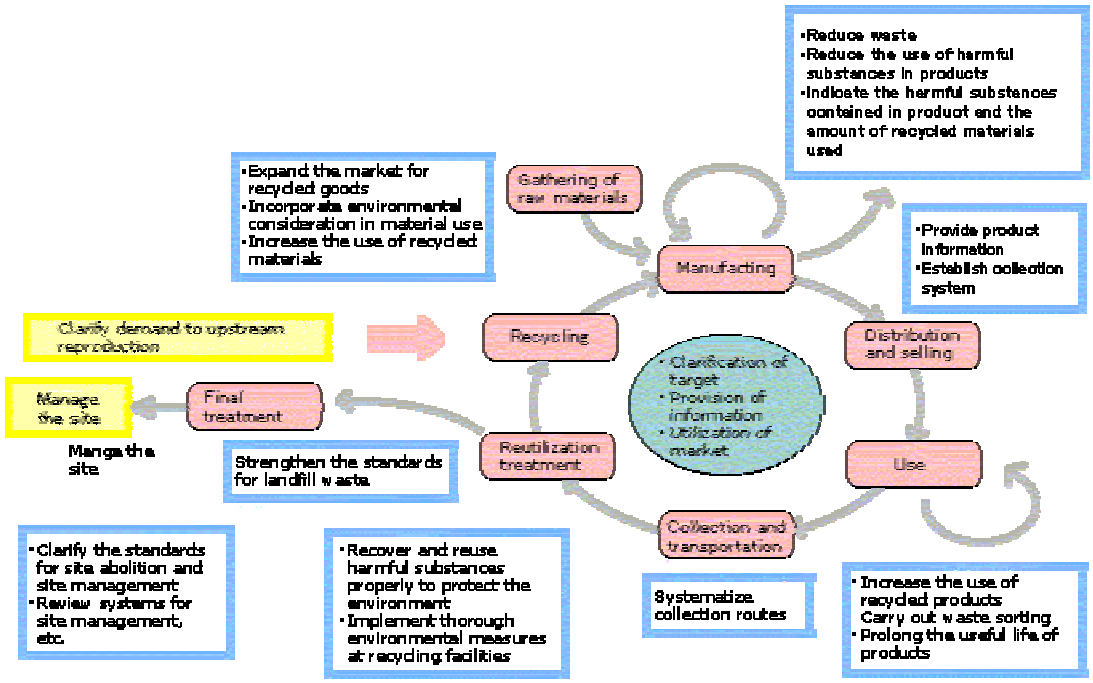


Figure 1.2.1 From "One-Way Consumption" to "Recycling-Based" Society

To achieve this objective, "The Basic Law for Establishing the Recycling-based Society" was enacted in May 2000. The Basic Law aims to promote waste measures and recycling measures comprehensively and systematically. The law stipulated priority efforts for waste disposal and recycling for the first time as follows.

The first effort is to reduce production of wastes as much as possible.

The second effort is to re-use, as many times as possible, things that are no longer needed.

The third effort is to recycle, as resources, things that cannot be used repeatedly.

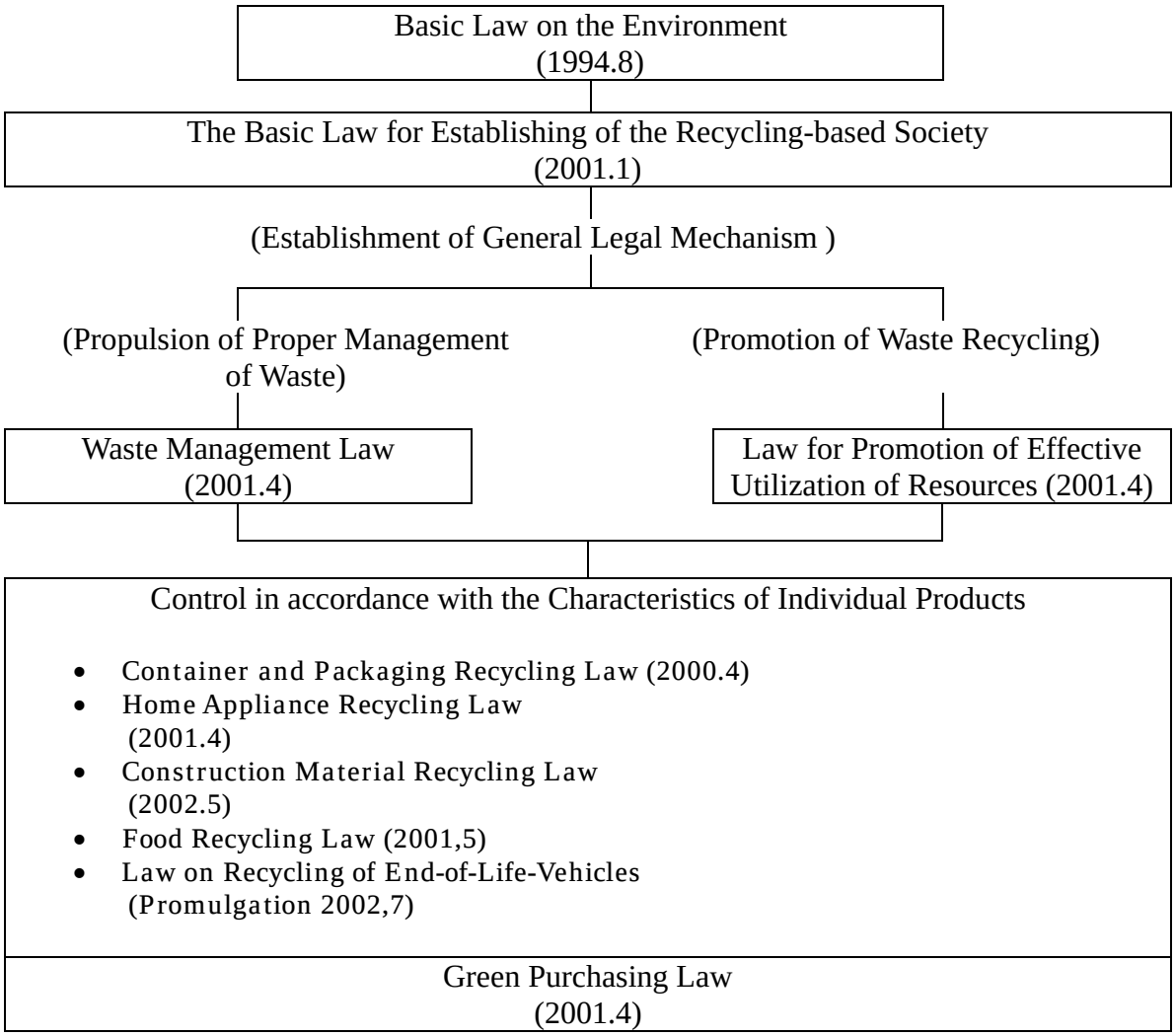
The fourth effort is to burn things that cannot be used as resources, and use the heat

[5] Source; Ministry Environment, Ministry Trade and Industry

produced from incineration.

The last effort is to appropriately dispose of things that cannot be re-used or recycled and that must be disposed of, in a manner that does not contaminate the environment.

In addition, individual laws, as show in the following figure, were established toward the establishment of a recycling-based society through integrated operation of these laws



Source: Ministry of Economy, Trade and Industry

Figure 1.2.2 Legal Framework toward Establishment of Recycling-Oriented Society

Objectives and contents of each law and act are as follows:

Waste Management Law (Revised)

Establishment of a framework for prefectures to establish facilities for safe and appropriate waste disposal.

Strengthening of responsibility of a discharging business party (who discharge wastes)

Prohibition of out door incineration, etc.

Law for Promotion of Effective Utilization of Resources (Revised from the Law for the Promotion of Utilization of Recycled Resources See below chapter b. in detail.)

Introduction of measures for restricting (reducing) the generation of wastes through saving product resources and prolonging the use life of products.

Introduction of measures for reuse of parts, etc.

Making it obligatory for businesses to systematically introduce measures to reduce and recycle by-products.

Making product collection and recycling obligatory for businesses.,etc.

Containers and Packaging Recycling Law

Making it obligatory for businesses who produce/use containers and packaging to recycle containers and packaging that have been sorted and collected.

Home Appliance Recycling Law

Making it obligatory for businesses who produce or sell electric household appliances to collect and recycle them.

Construction Material Recycling Law

Making it obligatory for a party that placed an order to dismantle a building, to report to the prefecture governor.

- Making the following obligatory for a party who has received an order to dismantle a building, etc:
- Sorted dismantling of specific construction materials (concrete, wood, etc.), etc.
- Reuse of specific construction material as resources
- A prefecture governor's advice, warning, or order to a party who received an order for dismantling, etc.
- Registration of building dismantling business parties with a prefecture overnor, etc.

Food Recycling Law

The National Government establishes standards related to efforts by food-related businesses (those that produce/sell foods, restaurants, etc.) regarding restriction of the generation of leftover foods and their recycling.

Food-registered parties will promote recycling, etc. in accordance with the standards.

A registration system for reuse businesses will be established, and use of foods as fertilizer and feed will be promoted.

Green Purchasing Law

Government agencies take the initiative in promoting the procurement of environmentally friendly products (eco-products), such as reproduced products, based on the procurement plan.

Provision of information helpful for "Green Purchasing", etc.

2) Law for Promotion of Effective Utilization of Resources

The Promotion of Utilization of Recycled Materials Law was enacted in 1991. It was

amended and the Promotion of Effective Utilization of Resources Law was officially announced in June 2000.. Figure1.2.3 illustrates the outline of the new Law. The competent minister drew up the policy to promote the reduction and re-use of used products and by-products. The role of industry and business people, consumers, and state and local governments is provided in the law. Under the Law, 10 industries and 69 products are designated as Special Resource Saving Promotion Industries, Designated Re-use Promotion Products and so on. More than 10 industries and 69 products cover approximately 50% of municipal waste and industrial waste in Japan. Industries and businesses will tackle 3R activities under a Ministerial Ordinance.. The Waste Recycling Subcommittee of the Industrial Structure Council has already worked out the guidelin

es for industry and business people. In these guidelines, waste minimization targets by each industry will be examined and determined by the industrial circles. Figure 1.2.4 illustrates the overall frame of the Law for Promotion of Effective Utilization of Resources.

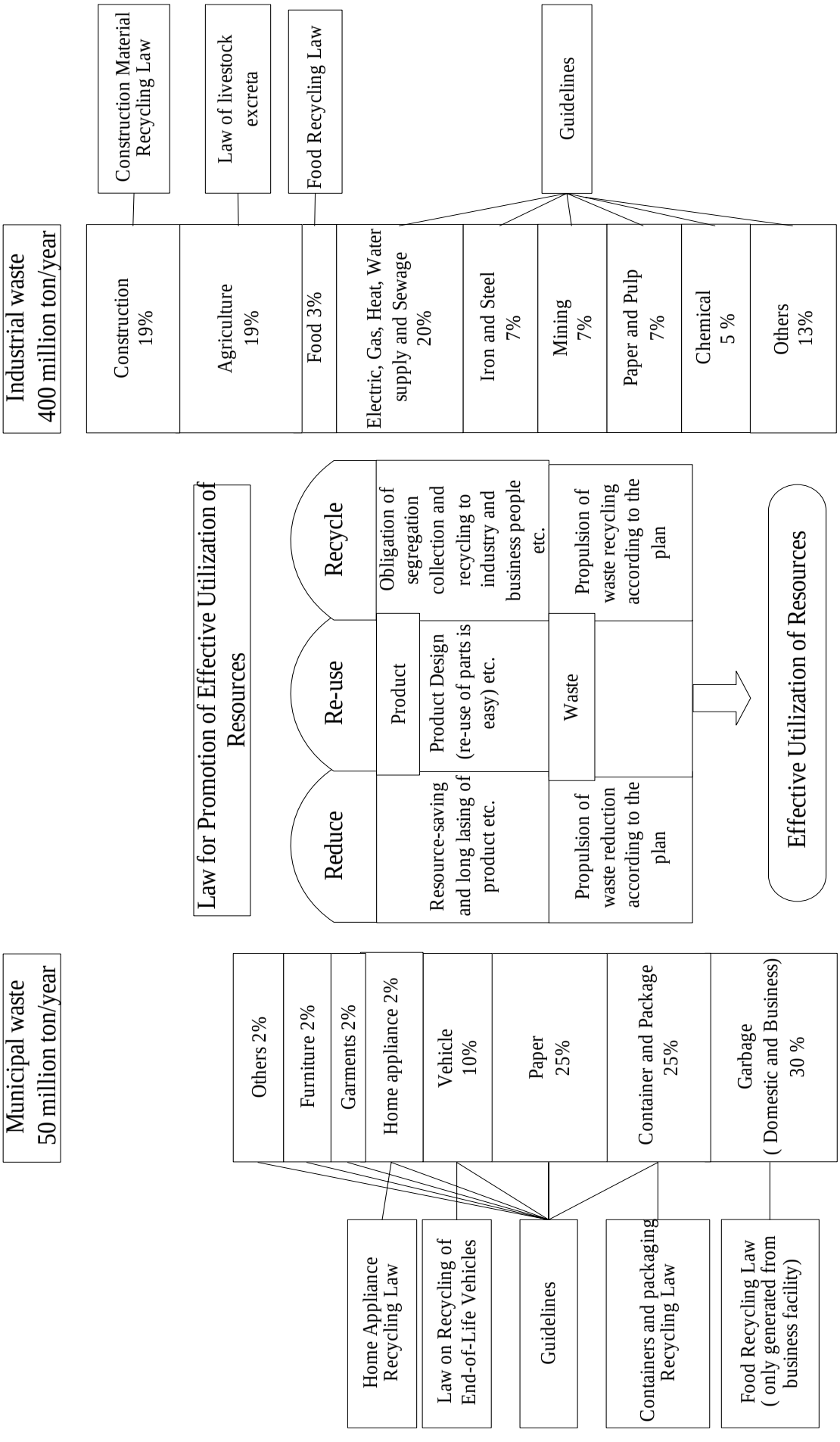
Basic Policy

Industry and Business	Consumer	State and Local Government
・ Rationalization of raw material to waste prevention of waste and by-product ・ Utilization of recycled material and parts ・ Promotion of utilization of waste and by-product as recycled material and parts	・ Long use of product ・ Promotion of utilization of recycled product (Cooperation for utilization and segregation of product that recycled material used) ・ Cooperation for measures that state and local government carry out	・ Funding ・ Promotion of utilization of recycled material upon official procurement ・ Promotion of encouragement of science and technology Effort of deepening of national comprehension

Designated Special Resource Saving Promotion Industry	Designated Special Re-use Promotion Industry	Designated Recycling Promotion Product	Designated Re-use Promotion Product	Designated labeling Promotion Product	Designated Recycling Promotion Product	Designated By-product
・Measures for promotion of waste prevention and recycling	・Measures for promotion of utilization of recycled material ・Measures for promotion of utilization of recycled parts	・Measures for promotion of resource saving and long lasting of product	・Measures regarding raw material ・Measures for promotion of utilization of recycled parts	・Measures regarding labeling for segregate collection	・Measures of promotion of recycling of used product	・Measures for promotion of utilization of by-product
Iron & Steel Paper & Pulp Organic & inorganic chemical Primary copper smelting etc.	Paper Glass ware Construction Copy machine Etc.	Car, Home electrical appliance Large furniture Oil and gas equipment Personal computer Pachinko board etc.	Personal computer Car Copy machine Pachinko board etc.	Steel can, Aluminum can, PET Bottle, Rechargeable battery Paper container & package, Plastic container & package, Vinyl chloride construction material etc.	Personal computer Rechargeable battery	Electric industry Construction industry

Source: Ministry of Economy, Trade and Industry

Figure 1.2.3 Outline of Law for Promotion of Effective Utilization of Resources



Source: Ministry of Economy, Trade and Industry

Figure 1.2.4 Overall Frame by the Law for Promotion of Effective Utilization of Resources

1.2.2 Utilization of Cement Industry in Terms of Waste Management

The Japanese cement industry is now drawing attention for its efforts in waste recycling and creation of disposal plants

1) Quantity and Type of Acceptable HW in the Cement Kiln

A cement product is made up with hydraulic clinker minerals in a predetermined proportion to maintain the basic properties of Portland cement clinker. Major composition of clinker mineral is CaO, SiO2, Al2O3 and Fe2O3. Not only natural raw materials but also wastes and by-products can be used theoretically as raw material for cement if they contain those ingredients. Table 1.2.1 is the general chemical composition of ordinary Portland cement.

Table 1.2.1 Chemical Composition of Ordinary Portland Cement

	Chemical composition (%)				
	SiO_2	Al_2O_3	Fe_2O_3	CaO	Total Alkali Na_2Oeq
Ordinary Portland Cement	20~23	3.8~5.8	2.5~3.6	63~65	0.3~0.7

As shown in the below table, the amount of the receiving wastes in 2000 is approximately 27 million tons or about 6% of whole industrial waste. They are recycled and disposed as alternative raw materials, fuels or mixing materials for cement product. The wastes that substitute for raw material occupy more than 85% of whole wastes. Non-ferrous metal slag is also utilized as the alternative iron and silica source. Another usage of waste utilization in the cement kiln is waste oils, organic wastes and so on as the substitution of fuel. For example, the industry utilizes about 465 thousand tons of waste oil, reclaimed oil (fuel oil) and waste activated clay as alternative fuel in Japan. Since the waste accepted in the raw material yard or fuel mixing tank is sintered at 1,450 ℃ and organic matter is completely composed. Any ash generated is incorporated into cement clinker. There is almost no waste from cement plant.

Table 1.2.2 Amount of Waste and by-Product recycled and Treated in the Cement Industry in Japan

Waste	Utilization	Process			Amount in 2000 (×1,000 t/year)
		R	C	F	
Blast furnace slag	Raw material, Mixing material			✓	12,162
Coal ash	Raw material, Mixing material	✓			5,145
By-product gypsum	Mixing material (Additives)			✓	2,643
Sludge	Raw material	✓	✓		1,906
Slag from non-ferrous metal smelting	Raw material	✓			1,500
Slag from waste iron recycling	Raw material	✓			795
Cinder and dust (excluding coal ash)	Raw material, Fuel	✓	✓		734
Wastes from coal processing	Raw material, Fuel	✓			675
Iron casting sand	Raw material	✓			477
Waste tire	Fuel		✓		323

Waste	Utilization	Process			Amount in 2000 (×1,000 t/year)
		R	C	F	
Reclaimed fuel oil	Fuel		✓		239
Waste oil	Fuel		✓		120
Waste activated clay			✓		106
Waste plastic	Raw material, Fuel		✓		102
Others	Fuel	✓	✓		433
Total					27,359

Source: Kankyo Shisetu No86, 2001

Legend: R; Raw material process, C; Calcinations process, F; Finishing process

2) Quality of Acceptable Waste

Clinker minerals need to be generated in a given quantity in manufacturing a cement product. Therefore, the amount of waste to be used as a substitute of raw material for cement is limited to a range where the chemical components of each raw material can be prepared. When waste or a by-product contains chlorine or alkaline components, it is necessary to determine, on analysis, if these components affect the product or manufacturing process. Also, some restrictions are imposed on use of waste or a by-product as a substitute of raw material and fuel for cement. If the kiln flue gas cannot meet the emission standards, the waste or by-product cannot be used. Table 1.2.3 shows the acceptance criteria of waste of a cement plant in Japan. Because acceptance criteria vary depending on each cement plant, negotiation with a cement company is necessary.

Table 1.2.3 Example of Acceptance Criteria of A Cement Company

Name of Industrial Waste	Acceptance inspection standard of Industrial waste	
	Quality and Property	Type of packing and Method of Transportation to the Plant
Waste tire	Car tire (any tire is accepted) Cut tire or tire without cutting	Bulk
Waste oil	Liquid or mud, Low volatile matter, Chlorine content < 1000 ppm, Heat generation > 12.5 Mj/kg (3,000 kcal/kg), Water < 20 %	Tank lorry or Drum (Tank lorry is preferable)
Petroleum oil, Heavy oil, Naphtha, Un-burnt dust	Water < 25 % Heat generation > 12.5 Mj/kg	Bulk vehicle with pressurized air un-loader or container bag (Bulk vehicle is preferable)
Sludge	Water < 25 %, R_2O < 1 %, Chlorine < 100 ppm	Bulk dump truck (Moisture control is essential to dusty waste)
Waste sand from cast iron process	SiO2 > 75 %, R_2O < 1 %, Water < 10 %, Without any foreign matter	
Waste wood, Waste plastics	Chlorine < 1000 ppm, Water < 10 %, Size < 250 x 250 x 250 mm	Bulk dump truck or container bag
Coal ash, Evacuated waste from furnace	Chlorine < 100 ppm, R_2O < 1 %	Bulk vehicle with pressurized air un-loader

Name of Industrial Waste	Acceptance inspection standard of Industrial waste	
	Quality and Property	Type of packing and Method of Transportation to the Plant
Aluminum sludge or aluminum ash	Al_2O_3 or Al > 60 %, Chlorine < 100 ppm, Water < 70 %	Bulk vehicle with pressurized air loader Bulk dump truck (Moisture control is essential to dusty waste)
Materials containing iron	Fe_2O_3 or Fe > 30 %, Chlorine < 100 ppm, Only small amount of metal as Cr, etc Powder, or grind able material	Bulk dump truck or container bag

Source: Hiroshi UCHIKAWA, Cement and Concrete Industry Orienting Toward Environmental Load Reduction and Waste Recycling, The International Conference of IUPAC, 1996 in Seoul, Korea

3) Technology Development of Eco Cement (Recycling of Incineration Ash of Municipal Aaste)

It should be noted that the cement industry is utilizing not only industrial waste; the industry has also started to utilize incineration ash that is generated from incinerated municipal waste. Approximately six million tons of ash from municipal waste incineration is generated annually in Japan. This is one of the causes of the shortage of final landfill sites. Since incineration ash contains four major components of ordinary Portland cement, technology development of new cement products in which incineration ash of municipal wastes is utilized as the one of the raw materials, has been carried out. The target quantity of ash and other waste content is 500 kg per one ton of cement product.

Because the municipal waste ash contains around twenty percent of chlorine originated from vinyl chloride package and foods, the cement kiln could not accept it. The chlorine content of the cement product is high and operational troubles such as clogging in the ducts occurs without pre-treatment. The cement industry has developed de-chlorine technology such as Chloride bypass system and Chloride washing process. A cement company has now finished the technological development of a special cement product which could decrease the chlorine content to 0.1 %. The manufacturing plant for the special cement product, named Ordinary Eco Cement, began operation in April 2001.. Since the content of chlorine is still little bit higher than ordinary Portland cement, the usage is limited, for example, so far it cannot be used for reinforcing bar concrete. Eco Cement has great prospects for the minimization of final disposal of municipal waste ash. Furthermore, the industrial circle commenced the investigation for JIS standardisation of Eco Cement. (JIS standard of chlorine content in ordinary Portland cement is 200 ppm) With JIS certification, the industry expects that Eco Cement can build social consensus. The industry is also expecting Eco Cement by “Green Purchasing” to come into wide use by state and local governments in the future.

4) Concept of Recycling-Based Society Utilizing Cement Industry As the Centre

Japan is now making efforts toward the realization of a cyclical society. As noted above, in 2000, important laws and acts were enacted and amended. The cement industry proposes the concept of Recycling-based society in which that industry plays a central role.

Figure 1.2.5 illustrates the concept of establishing a recycled-based society utilizing cement industry. The left side is called “Industrial clustering ”, showing a group in which

several different industries utilize waste, by-products and excess energy from other industries to be used as raw material or fuel. It is possible to treat and recycle hazardous waste, waste oil and non-ferrous metal slag in a group. The right side of the figure shows the conversion of domestic waste into resources. So municipal waste, sewage sludge and incineration ash are all directed toward the realization of zero-emission society. The industry will become more important than ever in the course of the realization of such society.

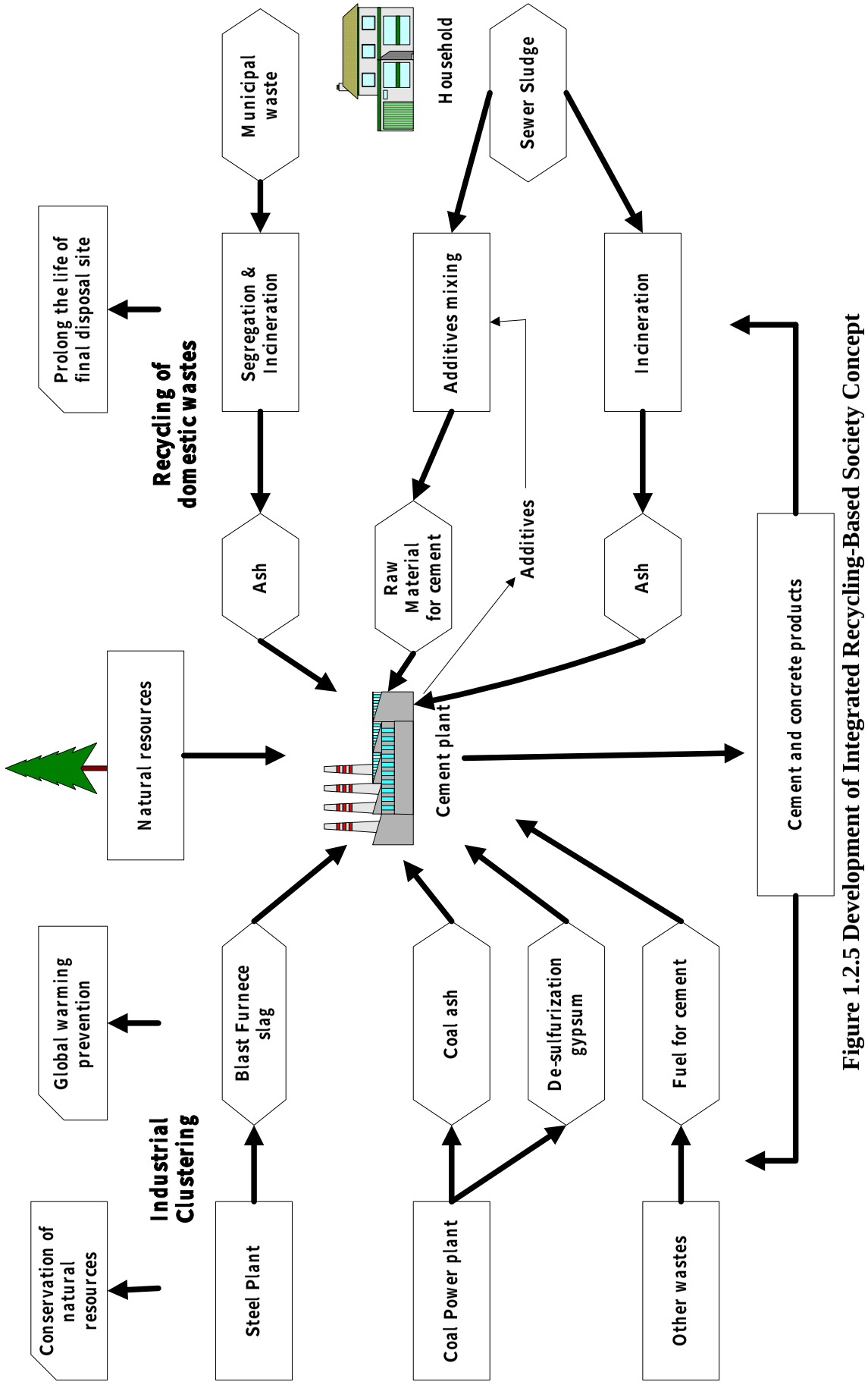


Figure 1.2.5 Development of Integrated Recycling-Based Society Concept

Source; Kankyo Shisetu No86, 2001

1.2.3 Lead Acid Cattery Recycling System

1) Problems Related to Aaste Lead Acid Batteries Recycling

Since lead has a low melting point and is easy to reclaim, it has been effectively recycled for many years. Usually the main usage of lead is for lead acid batteries. In Romania, secondary lead smelters recycle lead and its alloy from lead acid batteries. However, serious environmental problems are inherent in waste lead acid battery recycling in Romania. These are as follows:

Illegal dumping of sulphuric acid. Sulphuric acid solution from waste acid batteries is illegally dumped in the course of collection, and the waste batteries themselves are brought dried to the REMAT companies or other collectors. Water and soil contamination results from this illegal dumping.

Existence of illegal secondary lead smelters. Poor pollution and waste management of secondary lead smelters and lead acid battery manufacturer.

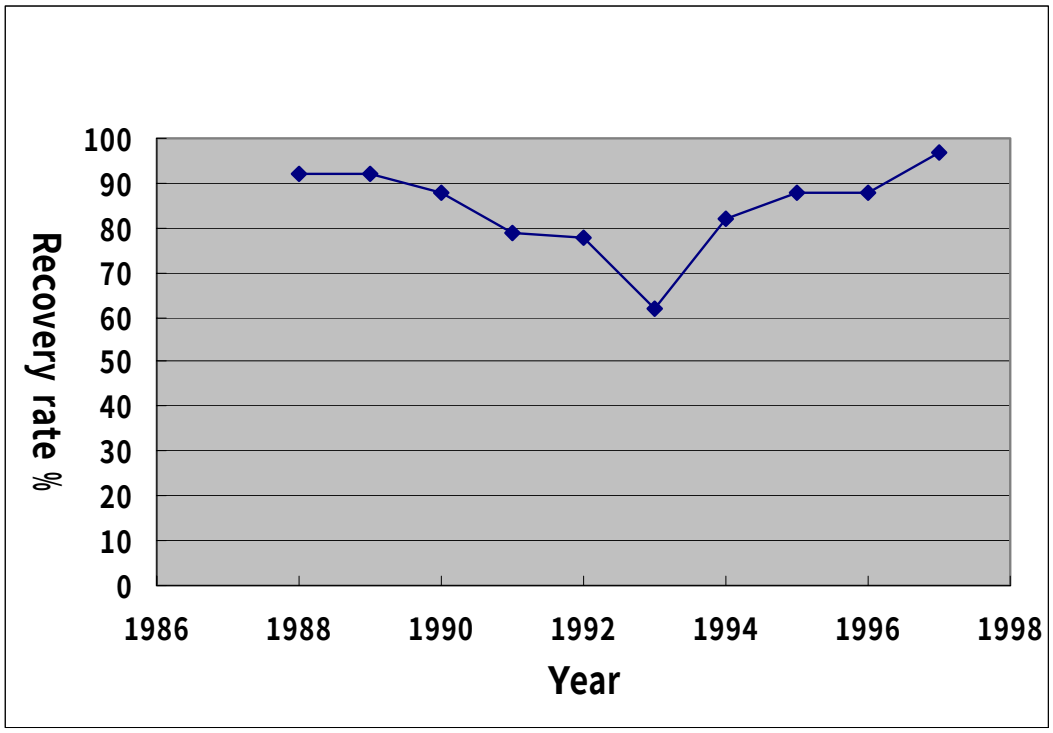
2) Waste Lead Acid Battery recycling Program in Japan[6]

(1) Lead Recycling Program

In Japan, waste lead acid batteries were traded as valuable commodities before the 1990s. In the 1990s, however, the market price of lead drastically dropped, and also the composition of lead acid batteries changed 7. Due to these factors, which developed rapidly, waste lead acid batteries lost their value. This situation destroyed the recovery, recycling and reuse of waste lead acid batteries. Figure 1.2.6 shows the change in recycling rate in Japan. Before 1990 the recycling rate was around 90% or so, but it dropped sharply to 60% in 1993. This caused environmental problems; waste lead acid batteries were sometimes left on roads or were otherwise dumped illegally.

[6] Source; Battery Association Japan

[7] Due to the diffusion of MF battery (Maintenance free type lead acid battery), the quality of electrode material had changed from lead-antimony alloy to lead-calcium-antimony alloy. Then demand of reclaimed lead (lead-antimony alloy) declined.



Source; Battery Association Japan

Figure 1.2.6 Recycling Rate for Waste Lead acid Batteries in Japan

The Lead Recycling Committee of the Japan Storage Battery Association begun to study the recovery and recycling of waste lead acid batteries in 1992. In June 1994, the government requested that the association should participate actively in recovering and recycling waste lead acid batteries from automobiles and motorbikes. In October 1994, the association published a "Lead Recycling Program" and five lead battery manufacturers have since been working in line with the program.

The program can be summarized as follows:

The five manufacturers, members of the Storage Battery Association, are requested to participate actively in recovery and recycling of waste lead acid batteries, and in reuse of recycled lead so that these firms fulfil their responsibilities as manufacturers for the utilization of recycled resources.

The five manufacturers are to purchase recycled lead at proper prices from lead recycling contractors (including lead primary smelters) that participate in the Lead Recycling Program.

Concerning recovery routes, "a reverse distribution" route system is employed while conventional recovery contractors are also effectively utilized. (See Figure1.2.7)

Primary smelters are requested to participate in the recycling effort (to promote production of recycled lead.)

The Japan Storage Battery Association is to survey, evaluate and improve the Lead Recycling Program to ensure that the program functions effectively.

Figure 1.2.7 shows "the trade-in recycling system", in which lead acid battery manufacturers become the generators of waste lead acid batteries. Under this system, waste lead acid batteries are recovered by manufacturers in the reverse direction of the selling route. Then waste lead acid batteries are delivered to a lead recycler with

manifest slip. Recycled lead by the lead recycler is purchased by the manufacturer at a proper price for a quantity corresponding to the quantity of lead discharged (used) by the manufacturer.

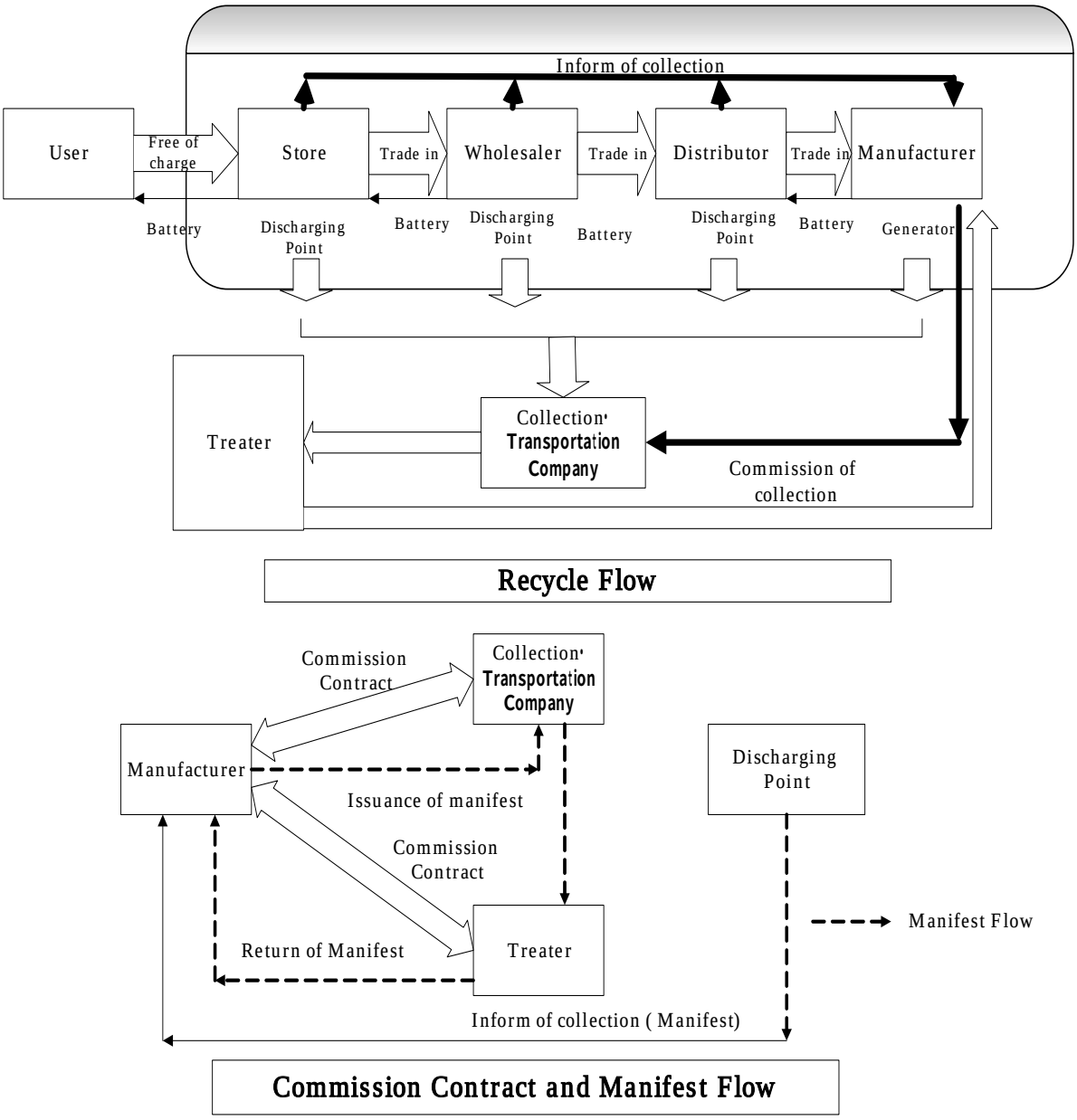
The store informs the manufacturer when trade-in waste batteries have reached a certain quantity, through manifest slip. A collection and transportation company, requested by the manufacturer, takes them to a primary and secondary lead smelter.

As MF batteries become more popular in the future in Romania and as it becomes necessary to produce new recycled lead, it will become important that primary lead smelters participate in the recycling program; it will be almost impossible for small and medium-sized recyclers to produce new lead (99.99% of lead). Since most primary lead smelters have wastewater treatment facilities, they will be able to neutralize waste sulphuric acid solution without new installation of neutralization plant.

In Japan, the Lead Recycling Program has achieved a successful result thanks to serious efforts by the five battery manufacturers. The recycling rate of waste lead acid batteries began to rise in 1994 and exceeded 95% in 1997. Recycling of waste lead acid batteries at a high rate can be evaluated as a good example of waste product recycling.

In the meantime, the fair sharing of recycling cost is being studied for the improvement of the program. Under the Lead Recycling Program, recycled lead, regardless of high purity lead or lead-antimony alloy, is purchased by lead acid battery manufacturers at a proper price irrespective of the market price of lead. There is no problem when the market price is higher than the recycled lead price; however, when the market price hovers at a low level for a long period, lead acid battery manufacturers are forced to bear the burden. Fair sharing among parties concerned (consumers in particular) is necessary

Romania has started a system where a battery sales store provides a customer with a 10% discount from the price of a new battery if the customer brings a waste lead acid battery to the store. We consider that the Japanese program, which involves end users and all the parties concerned in recovery, recycling and use, may be referred to as an example.



Source: Battery Association Japan

Figure 1.2.7 Introduction of New Collection System for Waste Lead Acid Batteries

1.3 Minamata Disease: A Case Study[8]

1.3.1 Introduction

In Japan, building a system of environmental conservation has continued since the 1960s, and today there are various types of measures for environmental conservation. However, because the previous period was one of rapid economic growth, various types of pollution-caused damage including damage to human health were created through productive activities which lacked proper attention to the environment. Minamata Disease is the classic case of pollution-caused damage in Japan, where drainage from a chemical plant destroyed the environment, causing severe damage to human health. On the other hand, because of the occurrence of Minamata Disease, the importance of pollution problems came to be widely recognized in Japan, and it stimulated drastic measures to combat pollution. It therefore created the opportunity to take measures for environmental conservation that laid the basis for today' s system.

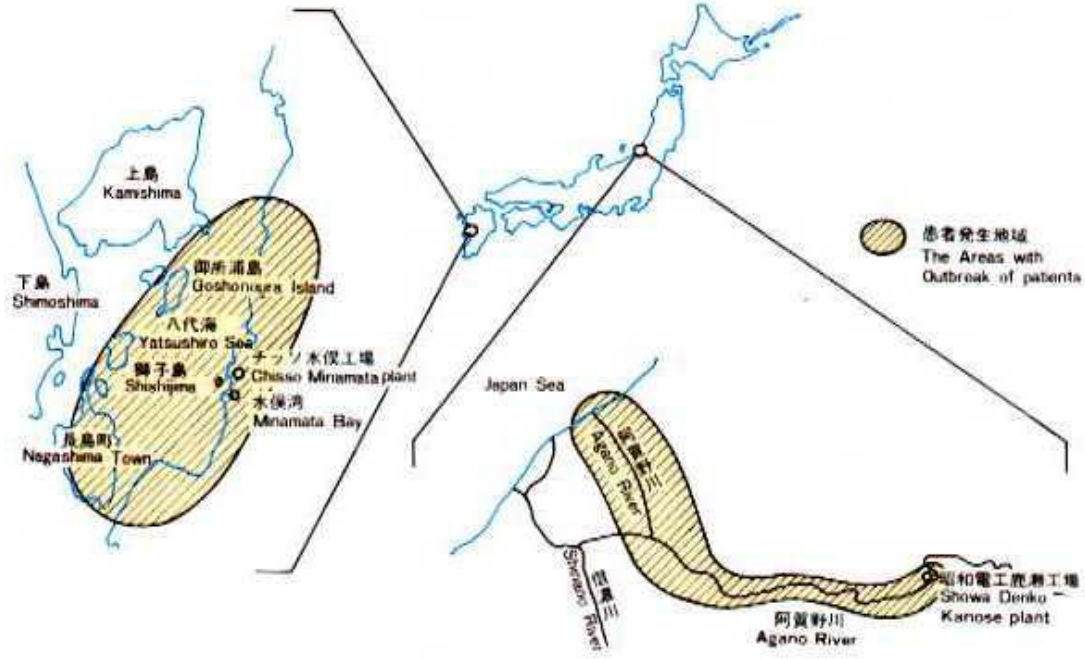
To understand the importance of measures for environmental conservation, it is useful to provide an illustration of how to react to the occurrence of a pollution problem, that is, to identify the seriousness of the damage and the kind of measures that are necessary. So we would like to describe the occurrence of Minamata Disease, and the measures taken as a result.

1.3.2 Outbreak of Minamata Disease

(Report of the first patient)

In 1956, in Minamata City located on the Yatsushiro Sea coast in Kumamoto Prefecture, the first Minamata Disease patient was reported as one who was suffering from neurological symptoms of unknown cause.

(Investigation of causes)



Source: Ministry of the Environment, 2002

Fig.1.3.1 Map of the Areas with Outbreak of Minamata Disease

After the report of the first patient, Minamata City immediately established the

[8] *(This section was cited with partial modification from "Minamata Disease - The History and Measures " 2002, Ministry of Environment, Japan http://www.env.go.jp/en/topic/minamata.html)*

Committee on Unknown Disease, to treat the patients and investigate the cause of the disease. The investigation was carried out energetically mainly by Kumamoto University, and in November 1956, the university reported that the disease is a certain type of heavy metal poisoning transmitted via fish and shellfish. However, because knowledge and experience about environmental pollution were not enough at that time and technology for analysis of very small amounts of chemical substances was insufficient, a great deal of time elapsed before the cause was made clear.

(Outbreak of Niigata Minamata Disease)

In 1965, Minamata Disease patients were also reported in the Agano River basin in Niigata Prefecture.

(The government's announcement)

In 1968, the government reviewed the knowledge related to Minamata Disease that had been collected by that time, and announced its opinion. It showed that Minamata Disease was a poisoning of the central nervous system caused by the methylmercury compound, which was produced as by-product in the process of manufacturing acetaldehyde at Chisso Co., Ltd. in Minamata City and Showa Denko Co., Ltd. located upstream of Agano River. This compound was discharged with the factory effluent and polluted the environment, and then, through the food chain, it accumulated in fish and shellfish. Minamata Disease occurred when the inhabitants ate large amounts of these seafoods.

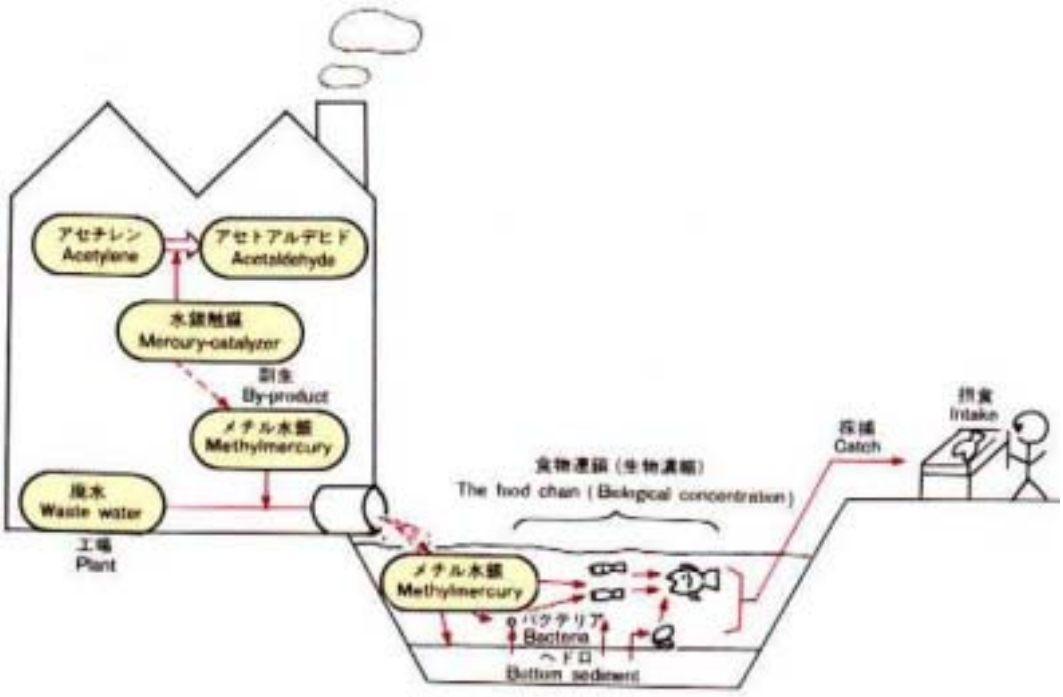
(The conditions of the occurrence)

As for Minamata Disease patients, by the end of March 2001, 2,265 persons have been certified on the Yatsushiro Sea coast and 690 persons in the Agano River basin based on the relief system described later. Even now, a small number of patients are certified, but all of them acquired the disease in the past, and according to various research studies, it is believed that conditions for a new occurrence of Minamata Disease have not existed since the early 1970s.

1.3.3 Signs and Symptoms of Minamata Disease

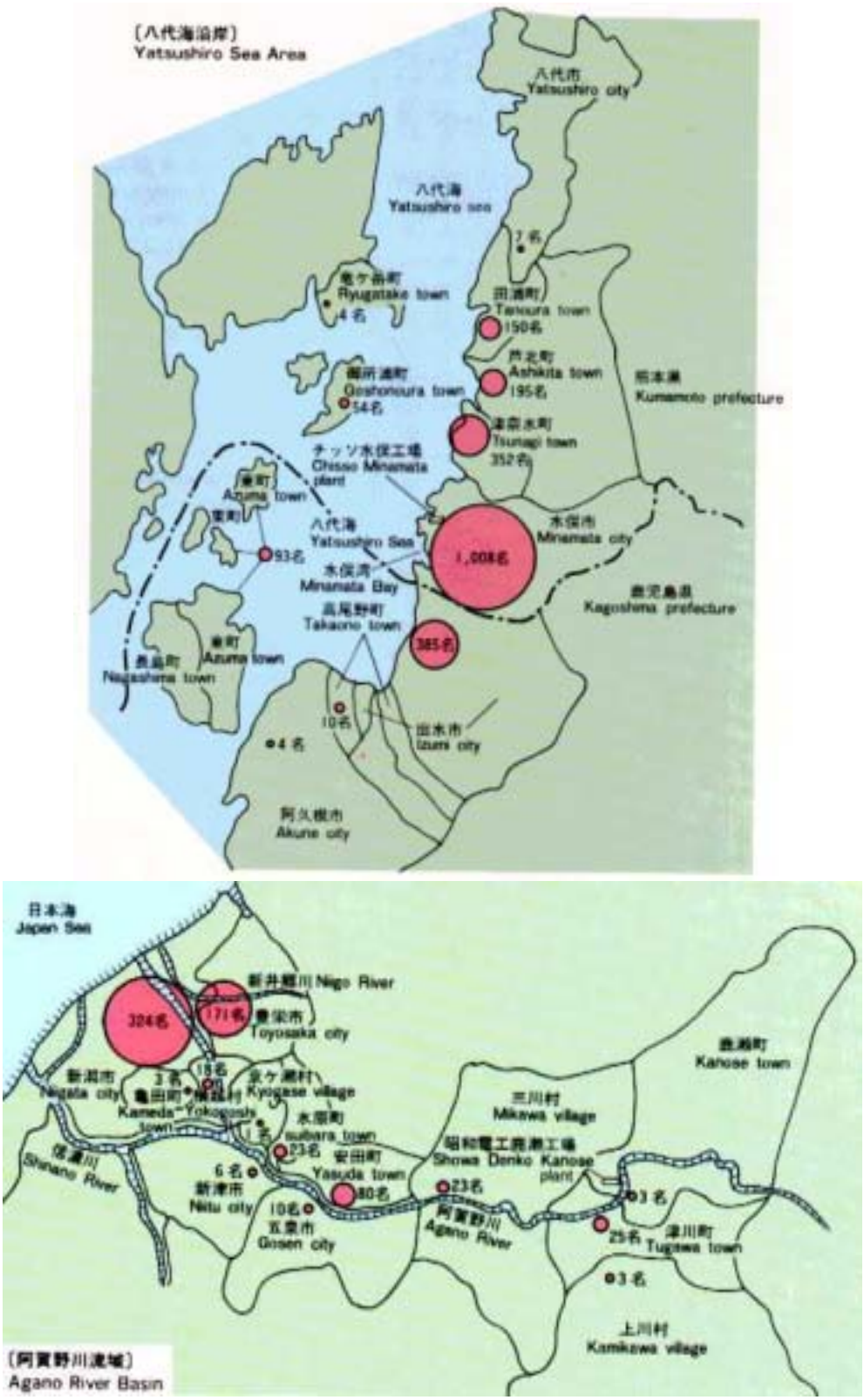
(Clinical features of Minamata Disease)

Minamata Disease is a disease in which the central nervous system (CNS) is damaged by methylmercury. It is established that the disease differs from inorganic mercury poisoning which damages kidneys, etc., and also, it has not been confirmed that it damages organs other than the nervous system. Clinically diverse signs and symptoms are manifested; the main signs and symptoms are sensory disturbance in the distal portions of four extremities, cerebellar ataxia, bilateral concentric contraction of the visual field, disturbed ocular movement caused by the CNS, impairment of hearing caused by CNS, and equilibrium disturbance caused by CNS. Also, fetal Minamata Disease is reported, which shows impairments similar to cerebral infantile paralysis because the mother has been exposed to methylmercury during pregnancy. In the initial stage of the outbreak of Minamata Disease, there were some patients who had all the major signs and symptoms, and some cases resulted in death. However, many patients do not have all the major signs and symptoms together.



Source: Ministry of the Environment, 2002

Fig.1.3.2 Scheme of How the Methylmercury Compound is Transmitted from the Acetaldehyde Manufacturing Process to the Human Body



Source: Ministry of the Environment, 2002

Fig.1.3.3 Distribution of Occurence of Certified Patients [31/Mar/2001]

(The process of onset of Minamata Disease)

There is the possibility of occurrence of Minamata Disease, like poisoning by other substances, when the quantity of methylmercury (the causal substance) accumulated within the body reaches a threshold value. If methylmercury taken into the body is discharged outside of the body at the same time,it will not accumulate in excess of the amount which would

correspond to that accumulated by continuous intake. This knowledge is supported by "IPCS Environmental Health Criteria 101 Methylmercury", issued by WHO in 1990.

(Diagnosis of Minamata Disease)

Because each neurological sign and symptom of Minamata Disease can be caused by other diseases as well, diagnosis of Minamata Disease is carried out for people who have been exposed to methylmercury on the basis of diagnostic criteria which are composed of combinations of signs and symptoms. While diagnosis is easy for patients who exhibit all the major signs and symptoms, in the case of incomplete or mild types of the disease, it may be difficult to distinguish it from other diseases.

Table 1.3.1 Various Indices Showing the Threshold Value for Onset of Symptoms in Human Body

(Level at which neurological symptoms would appear in the most sensitive adults)

Average daily intake	3-7 μg/kg
Body burden	15-35mg/50kg weight
Total mercury concentration in blood	20-50 μg/100ml
Total mercury concentration in hair	50-125 μg/g

Source: "IPCS Environmental Health Criteria No.101 Methylmercury",etc.

Table 1.3.2. Effluent Standard for Mercury Based Upon the Water Pollution Control Law

Total mercury	0.005mg/l
Alkyl mercury compounds	Must not be detected (Limit of detection 0.0005mg/l)

1.3.4 Measures Against Minamata Disease

As we will describe below, many measures have been taken up to now against Minamata Disease.

1) Measures Against Environmental Pollution

(Closing down of the pollutant sources)

With regard to the Minamata plant of Chisso Co., Ltd., due to completion of a perfect circulation system in 1966, water effluent containing methylmercury compound has not been discharged outside of the plant since that date, and the pollutant source itself was eliminated through cessation of the production of acetaldehyde in 1968. In the Agano River basin the process of producing acetaldehyde had already closed before Minamata Disease was discovered.

(Effluent control)

In 1969, drainage of factory effluent containing methylmercury to Minamata Bay was regulated. In 1970, the Water Pollution Control Law was enacted, which enforced control of discharge of effluent in all water areas in Japan in relation to toxic substances, for example, mercury and cadmium. Furthermore, conversion of the production method was advised for caustic soda plants other than Chisso and Showa Denko that might discharge mercury.

(Restoration of the environment)

Methylmercury remained a considerable concentration in the bottom sediment of the related water areas even after the discharge of the methylmercury compound was stopped. To

address this problem, from 1974 to 1990, Kumamoto Prefecture carried out a project for dealing with about 1,500,000 cubic meters of bottom sediment of Minamata Bay that contained mercury over the removal standard (25ppm of total mercury) by means of dredging and a 58ha. landfill, at a total cost 48 billion yen (of this total, the responsible company bore 30.5 billion yen). In 1976, Niigata Prefecture carried out dredging of river bottom sediment that contained mercury over the removal standard around the drainage outlets of the Showa Denko plant. This was done at the expense of the responsible company.

Legend

- Dredged area
- Landfill area
- Main monitoring points
- Secondary monitoring points
- Reference survey points
- Underground water monitor points
- Dividing nets *
- Catching nets *
- Section dividing nets *
- Acoustic device *
- Fish breeding facility

* Removed in Oct. 1997

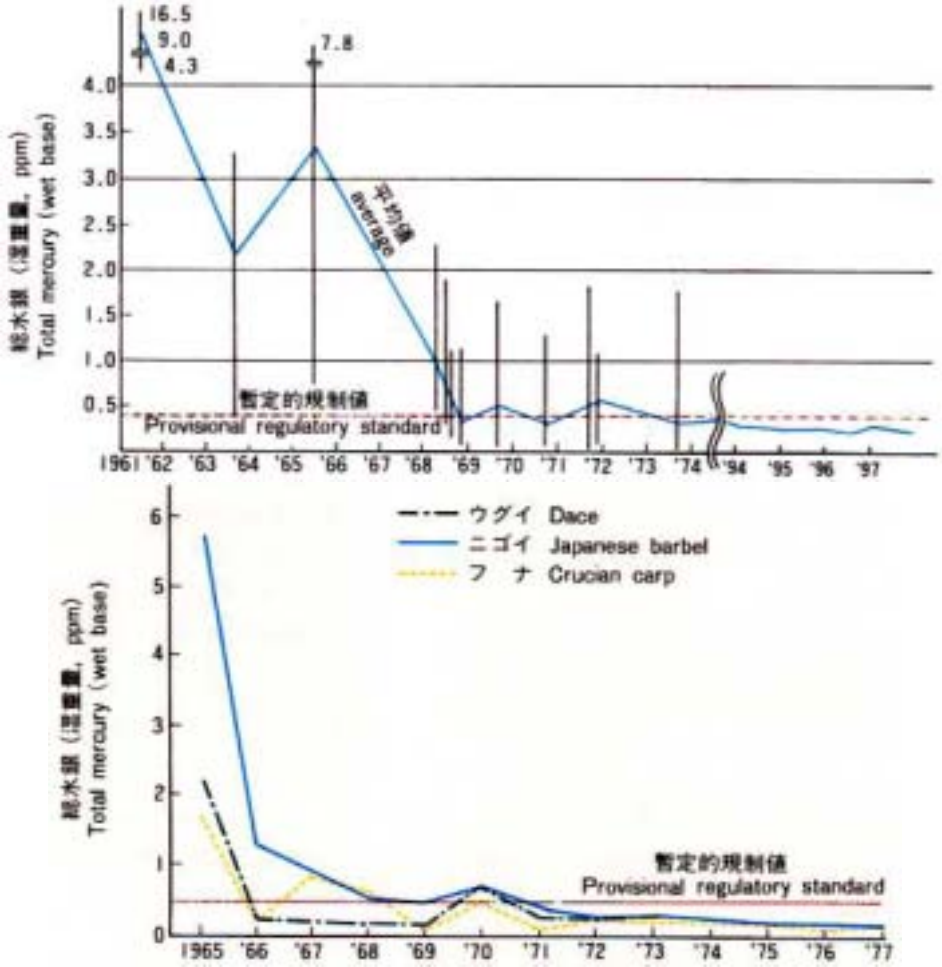
Area	Treated area	Volume of sludge disposed
Landfill area	582,000 m2	726,000 m2
Dredged area	1,510,000 m2	784,000 m2
Total	2,092,000 m2	1,510,000 m2

Source: Ministry of the Environment, 2002

Fig. 1.3.4 Dredging of Minamata Bay

(Restraint on intake of fish and shellfish, and compensation to the industry)

In the area around Minamata Bay, in 1956, when it became clear that intake of fish and shellfish might be the cause of the disease, the control of intake of fish and shellfish taken from Minamata Bay and self-restraint of work by the fishing cooperative was started under the guidance of Kumamoto Prefecture et al. This guidance lasted with some interruptions until early in October 1997, when the dividing nets in Minamata Bay were completely removed. During this period, Chisso Co. Ltd. paid to the fishing industry as compensation, 140 million yen in 1959 fiscal year (FY), 3,930 million yen in 1973-74 FYs, and 950 million yen in 1992-98 FYs. In the Agano River basin, after June 1965, when Minamata Disease was just discovered there, Niigata Prefecture took measures that contained guidance for the concerned fishing cooperative to exercise self-restraint in catching fish and shellfish, and for the concerned people to control their intake.



Source: Ministry of the Environment, 2002

Fig. 1.3.5 Transition in Pollution Level of Fishes

(Note) The provisional regulatory standard for fish has been established, stipulating 0.4 ppm for total mercury and 0.3ppm for methylmercury.

(Transition in conditions of pollution)

In the area around Minamata Bay and the Agano River basin, until now various types of research about water quality, bottom sediment, fish and shellfish, hair sample, etc., have been carried out with respect to environmental pollution As a result, it is thought that continuous methylmercury exposure at the level which could cause Minamata Disease existed until no later than 1968 in the area around Minamata Bay, and until no later than 1965 in the Agano River basin, and that, from that time, there has not been such exposure that could lead to the recurrence of Minamata Disease. Monitoring of methylmercury concentration of fish and

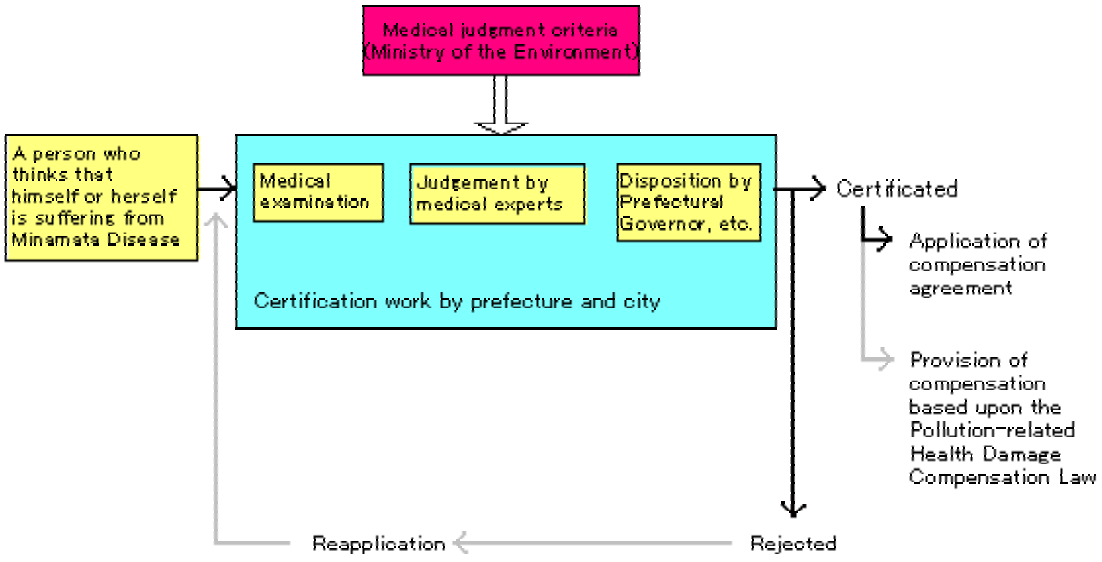
shellfish continues even today in the area around Minamata Bay and in the Agano River basin.

2) Relief of Minamata Disease Patients

(Relief based on the law)

At the beginning of the outbreak of Minamata Disease, the concerned local government had provided Minamata Disease patients with financial assistance for associated medical expenses. However, because matters of health damage caused by pollution had become obvious all over Japan since the 1960s, the Law Concerning Relief of Pollution-related Health Damage was enforced in 1970, under which benefits for medical expense, cost for hospital visits, etc., were provided for all sufferers of pollution-related health damage, and Minamata Disease of Kumamoto and Niigata became subject to this law. Then in 1974, the Pollution-related Health Damage Compensation Law [now the Law Concerning Compensation for Pollution-Related Health Damage and Other Measures (hereinafter referred to as the Compensation Law)] was enacted, under which income compensation was provided in addition to medical expense for sufferers of pollution-related health damage, so the content of relief provided to sufferers of pollution-related health damage has been improved.

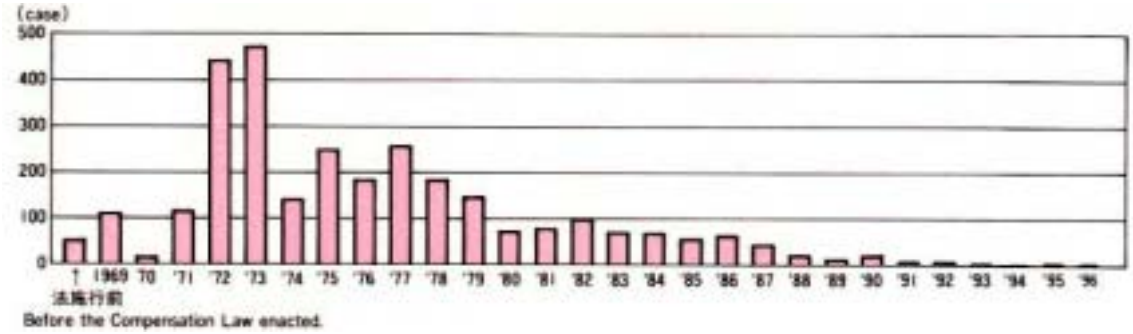
As a result, compensation based on the Compensation Law is provided to those who are certified as patients of pollution-related disease based on the Compensation Law at the expense of the responsible company for pollution, so sufferers from pollution-related health damage can receive compensation without raising suits and proving of their own accord the causal relationship between the pollution and the their disease. However, with regard to Minamata Disease, because the agreement which provided for payment of a large amount of compensation was concluded between the responsible company and the patients, those who are certified as Minamata Disease patients based on the Compensation Law receive compensation from the responsible company based on the agreement. Certification that they suffer from Minamata Disease is carried out by the concerned prefectural government based on the result of medical examination and consideration by medical specialists concerned with Minamata Disease, and those who are knowledgeable about the diagnostic criteria which was decided as the minimum requirement to distinguish those who suffer from Minamata Disease, rather than from some other disease.



Source: Ministry of the Environment, 2002

Fig. 1.3.6: Diagram of the Minamata Disease Certification System

Through this system, 2,955 persons have been certified as Minamata Disease patients in the Yatsushiro Sea area and the Agano River basin, and a total of approximately 144.1 billion yen has been paid as compensation by the responsible companies (As of March, 2001). At the present time, it is unthinkable that Minamata Disease would recur, but the work of certification based on the Compensation Law still continues, because there are some people who apply for certification repeatedly even after previous applications have been denied, or who did not apply in the past for some reason. Because patients who have most of the signs and symptoms that are characteristic of Minamata Disease have already applied for certification and have been certified from the start of the program, almost all of the people who apply now are those who cannot be certified medically as Minamata Disease or are difficult cases to be medically decided.



Source: Ministry of the Environment, 2002

Fig. 1.3.7 Transition in the Number of Certification

Table 1.3.3 Comparison of the Payment of Compensation Under Compensation

Agreement and the Payment of Compensation Under the Compensation Law

(In the case of a person aged 65 years or older (more than half of Minamata Disease patients are in this category) who is suffering from the severest degree of disabilities)

Item	Amount per patient (as of April, 2001)	
	Compensation Agreement (Between Chisso Co. and the Patients)	The Compensation Law
Benefit related to medical Expense	Medical expense: Total amount of medical expense related to Minamata Disease	Provision of medical treatment and treatment expense: Total amount of medical expense related to Minamata Disease
Direct cash benefit (Lump-sum benefit)	Solatium About 22million yen (Average (per capita) of actual compensation. Depending on the situation of relations)	
(Continuous benefit)	Life-time special adjustment allowance 169,000 (yen/month)	Disabillty compensation benefit 221,700 (yen/month)
Benefit related to the cost of Non-medical care	Cost of non-medical care: Equivalent to the benefit paid under the Compensation Law. Allowance for care assistant:24,000(yen/month)	Additional benefit for care 48,100 (yen/month)
Benefit related to the cost of health Services, etc.	Medical allowance: Equivalent to the benefit paid under the Compensation Law	Treatment allowance (ex. For hospitalization of 15 days or more) 36,400 (yen/month)
Benefit related to the cost of funerals, etc.	644,000 yen	661,000 yen
Others	Acupuncture, moxibustion, massage, hot spring treatment, etc	

(Survey of health damage)

In the area around Minamata Bay, the research to investigate the cause and the nature of Minamata Disease was carried out mainly at the beginning of outbreak of Minamata Disease, and the first full-scale survey to grasp the extent of the health damage was carried out for about 110,000 habitants of the area around Minamata Bay in 1971 after the cause of the Minamata Disease was made clear. In the Agano River basin, immediately after the discovery of patients, a series of health surveys of the inhabitants were carried out by the prefectural government, and the scale of the survey has been approximately 80,000 for cumulative total of subjects.

3) Environment Health Measures for Inhabitants

At the present time, there is no possibility of exposure to methylmercury that could lead to the occurrence of Minamata Disease and no evidence that intake of such a level of methylmercury results in any effect on health. However, in the area where there had been an outbreak of Minamata Disease, because fish and shellfish polluted with methylmercury were widely distributed and eaten in the past, there remains a possibility that those who did not incur Minamata Disease may have been exposed to high levels of methylmercury, and anxiety about the health effect of methylmercury still exists among inhabitants of the concerned area. For these reasons, the Government has continued to implement the Task of the Comprehensive Measures against Minamata Disease since 1992. This consists of the Task of Health Care that includes periodic health examination for inhabitants, and the Task of Medicine that is to provide medical expense and medical allowance for the costs of related medical treatment for those who suffer from neurological signs and symptoms similar to those of Minamata Disease.

4) Financial Assistance to the Responsible Company

Compensation for patients of Minamata Disease in the Yatsushiro Sea area is being carried out by Chisso Co., Ltd. Because of limitation on its solvency of the compensation and the burden charge of the dredging project, necessary financial assistance is designed to ensure that there will be no interruption in the payment of compensation, maintaining the basic principle of the responsible company bearing the burden.

5) Promotion of Research and Investigation

With regard to Minamata Disease, a large number of researches and investigations have been carried out, and many facts have been clarified concerning the clinical features of Minamata Disease, the mechanism of damage to the living body caused by methylmercury, etc. The Government has provided a broad range of support to these researches and investigations, and has actively carried out its own studies, including establishment of the National Institute of Minamata Disease (NIMD) for comprehensive research program. The Institute was designated as a cooperating institution of WHO in 1986. In 1996, NIMD was reorganized, and it now provides information based on the Japanese experience related to the mercury poisoning in response to requests from other countries, and to make contributions in terms of international cooperation in the field of environmental health.

1.3.5 Political Settlement of Minamata Disease Issues

1) The Final Plan for Settlement by Three Ruling Coalition Parties

The issues of compensation to the patients certified based on the Compensation Law were settled by the Compensation Agreement in 1973. However, there have been administrative and litigation appeals against rejections of the applications for Minamata Disease certification, and there have been damage suits and direct negotiations conducted mainly by those certification have been rejected. These issues remained unsettled until the three ruling coalition parties (Liberal Democratic Party, Socialist Party (now the Social Democratic Party) and New Party Sakigake) submitted the final plan for settlement for Minamata Disease issues related to Kumamoto and Kagoshima Prefecture in response to the opinion of the parties concerned in September 1995. All the parties concerned declared their acceptance of the settlement by December 1995. As for Minamata Disease issues related to Niigata Prefecture, the agreement based on the final plan for settlement by three ruling coalition parties was

concluded through direct negotiation between the patients' group and Showa Denko Co., Ltd.

2) Outline of the Settlement

(The agreement between the parties concerned related to Kumamoto and Kagoshima Prefecture)

In the final plan for settlement by three ruling coalition parties, all conflicts related to Minamata Disease should be settled immediately, finally, and totally under the framework; [1]the company pays a lump sum (2.6 million yen per capita) to people who should be relieved, [2]the Nation and Kumamoto Prefecture express some responsible attitude, for example regret, at the final and total settlement of Minamata Disease issues, [3]people who will be relieved conclude the conflicts, for example by withdrawing the suits. And also, at the conclusion of the conflicts, the Nation and the Prefecture should continue the Task of Medicine of the Comprehensive Measures for Minamata Disease and resume to accept applications, and should take measures to support Chisso Co., Ltd., and to recover and promote the region.

(The agreement between the parties concerned related to Niigata Prefecture)

The framework of the agreement between the parties concerned related to Niigata Prefecture is almost the same as the final plan for settlement related to Kumamoto and Kagoshima Prefecture; the company pays a lump sum to people who should be relieved, the Nation and the Prefecture continue the Task of Medicine of the Comprehensive Measures for Minamata Disease and resume acceptance of applications, and people who will be relieved conclude the conflicts, for example by withdrawing the suits. In addition, it was agreed through direct negotiation between patients' group and the company that the company should donate 250million yen to Niigata Prefecture to recover and promote the region.

3) The Agreement in the Cabinet Meeting, etc.

Based on the above-mentioned agreement between the parties concerned, in order to take measures promptly for final and total settlement of Minamata Disease issues as the Nation, the Government held the meeting of the members of the Cabinet concerned for the Minamata Disease in December 1995, and made the arrangement with "On the Measures against Minamata Disease", whose content was to resume to accept applications of the Task of Medicine of the Comprehensive Measures for Minamata Disease and to forward and support the measures to recover and promote the region. And on the same day, it made the agreement of the Cabinet meeting about it, and also made the decision of the Cabinet meeting for "Prime Minister's Announcement for the settlement of Minamata Disease issues". The Government implemented these measures.

1.3.6 Conclusion

Environmental pollution by toxic substances results in serious damage such as health damage and destruction of the living environment. In the case of Minamata Disease, the agreement was concluded between patients' groups and the companies, and the suits were concluded by compromise between plaintiffs and the companies, and by withdrawing of suits between the nation and plaintiffs, so social troubles were reduced. But in the areas where the disease occurred, certified patients are still suffering from symptoms, and anxieties about health among inhabitants remain. From this example of Minamata Disease Japan has learned the lesson that activities that give priority to economic goals but lack proper attention to the environment do various and serious damages such as those to public health, and it is not easy to recover from the damage later on. It is also clear that this approach is not economically justified, because the cost of the damage and the remedial measures are far more costly than a preventive

approach.

In Japan, with the experience of disastrous damage by pollution including Minamata Disease issues as a turning point, measures to protect the environment have made dramatic progress, but the sacrifices incurred on the way were huge. We hope that it will be realized again how consideration to the environment is important and that efforts will be made to prevent environmental pollution without a experience of disastrous pollution, making such experience in Japan as a lesson, in other countries.

Table 1.3.4 Comparison of the Cost of Damage Created by Minamata Disease in the Area Around Minamata Bay to the Cost of Pollution and Control Measure

Cost for Pollution Control and Prevention Measures 1)	123,000,000 yen/year
Damage amount	12,631,000,000 yen/year
Breakdown: Health damage2)	7,671,000,000 yen/year
Environmental pollution damage3)	4,271,000,000 yen/year
Fishery damage4	689,000,000 yen/year

Source: "Nihon no Kogai Keiken"Japan's Experience with Pollution, 1991

[Notes]
1) Yearly average paid by Chisso Co.,Ltd., in the form of investments to prevent pollution damage.
2) Yearly average of compensation benefits paid to patients under the Compensation Agreement, etc.
3) Yearly average amount of expenditure for dredging work in Minamata Bay.
4) Compensation paid to the fishery industry computed as equal redemption of principal and interest prorated as yearly payment.

Annex 2

Relevant EU/UK Experience in Hazardous Waste Management

Annex 2 Relevant EU/UK Experience in Hazardous Waste Management

2.1. Introduction

Considerable work has been undertaken by the International Solid Waste Association (ISWA) comparing the approached in different European and other countries towards development of waste management systems. The ISWA Working Group on Hazardous Waste published its first major output, International Perspectives on Hazardous Waste Management (Academic Press, 1987). This book comprised a series of 12 country reports prepared by members of the Working Group, together with a comparative analysis, Summary and Analysis of Hazardous Waste Management in ISWA Countries, compiled on behalf of the Working Group by the UK member, Dr David Wilson.

The original comparative analysis was based on a series of tables, comparing and contrasting the features of the regulatory control systems for hazardous waste management in the 12 countries. These tables were updated and expanded in 1999 to cover 18 countries or territories. The updating work draws upon the experience gained during several ERM consulting projects, most notably a World Bank supported project for the Development and Demonstration of a Regulatory Management System for Hazardous Waste Control at the Regional Level in Sverdlovsk Oblast in Russia.

Much of this Annex draws on the outputs of the foregoing work and reproduces several of the key tables. The JICA team members have expanded on certain areas of this and commented further on aspects most relevant to Romania and the current project.

2.2 EU Experience

In Europe it has been found that the progressive, simultaneous and step by step development of the four basic elements of the overall hazardous waste management system - Legislative Base, Enforcement, Facilities and Support services is an essential success factor. Securing the development of necessary infrastructure (hazardous waste management facilities) has been one of the most difficult steps worldwide.

The UK is the only country in Europe that has achieved the development of a country-wide hazardous waste management system with no assistance from the public sector with regard to infrastructure development. Other countries that have developed such systems have done so with the aid of public-sector assistance when developing the infrastructure. Table 2.1 indicates the different approaches in the EU (and some other countries). However in the UK, the private sector invested in hazardous waste incineration some years ago (1973) on the basis of a market survey that identified significant volumes of wastes suitable for incineration. Unfortunately, the permitting system continued to allow combustible wastes to be landfilled and there was an unwillingness by companies to pay for incineration costs; the companies operated at a loss for several years until landfills were no longer permitted to accept these wastes.

2.2.1 Infrastructure Development

In the UK, waste and hazardous waste legislation was introduced in the late 1960s and early 1970s and enforced against a background of strong public awareness resulting in a

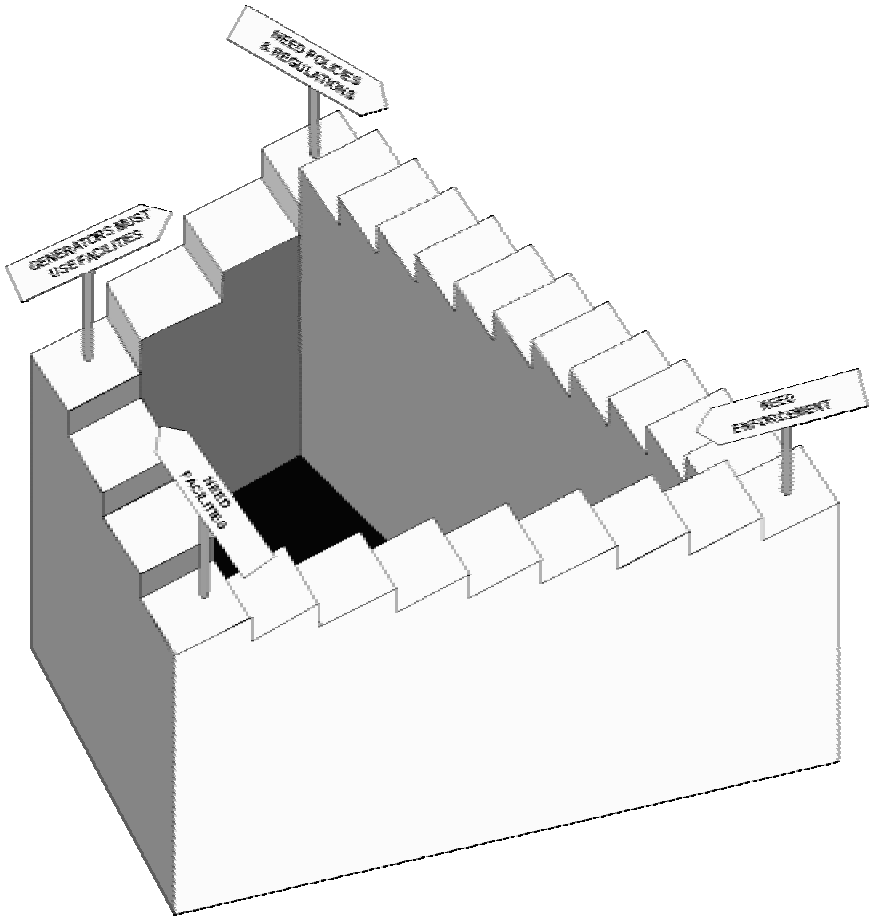
hazardous waste market need to be met. The hazardous waste management field was newly emerging and developed in response to the slowly emerging market need stimulated by the new legislation. Initially relatively low-technology processes were used which gradually became more sophisticated as standards and legislation developed in parallel.

In other European countries centralised facilities were initially developed as public-private sector collaborations usually with the public sector involvement being phased out over several years.

In Denmark, Finland and some German States (and previously in Spain (Catalonia) and Sweden), major treatment facilities are provided by a state utility, which is a co-operative venture between central government, local communities and industry. A state utility company also exists in Norway, but more as a facilitator and resource body rather than as a service provider: any person or company managing (undertaking collection, storage and treatment of) hazardous waste is required to have a corporate agreement with this company (The Norwegian Resource Centre for Waste Management and Recycling, Norsas).

In a number of other countries, the public and private sectors have also collaborated in providing facilities, often with substantial initial investment from government (eg the Netherlands). In France, the facilities are entirely provided by the private sector, but substantial finance was originally made available on attractive terms by government. Of the countries with well-established systems, only the UK and USA have relied entirely on the private sector for the provision of facilities from the beginning.

The problem, simply stated is that the private sector is unwilling to invest in the development of centralised facilities unless it is sure it will get a return on investment. These potential investors are generally looking for this security in the form of an established regulation and control system with effective enforcement leading to a willingness of the waste generator to pay. The enforcement cannot happen if the facilities do not already exist. For example, it is not possible to implement and enforce legislation which tells waste generators that certain types of facilities need to be used for specified types of hazardous wastes, unless those facilities exist and are accessible. This dilemma is illustrated in figure 2.2.1. The result is that the investor confidence has to be stimulated in another way.



Source: Environmental Resources Management

Figure 2.2.1 The Infrastructure Dilemma

The UK was different because the development of the system was relatively slow with the infrastructure developing gradually in response to the gradually developing waste generator willingness to pay which was promoted by the gradual implementation of regulation and control. The infrastructure development in the UK also started with relatively simple, cost effective technologies which became progressively more sophisticated over a period of five to ten years. The latter resulted in a progressively increasing cost to the waste generators rather than a sudden massive increase.

The different approaches to promoting the development of hazardous waste management infrastructures are shown in Table 2.2.1.

2.2.2 Regulation and Control of Waste Management

As indicated above, the first legislation appeared in the UK in the late 1960's and has continually evolved. Controls focus on each element of the waste management process from generation through collection and transportation to treatment and final disposal. More recently, controls have also focused on closure and aftercare of waste management facilities and on moving waste "up" the waste management hierarchy.

Table 2.2.2 summarise the main elements of each country's regulatory system.

1) Hazardous Waste Generation

Controls on hazardous waste generation in the UK and Europe have generally focused on:

- Identification of hazardous wastes,
- Proper interim storage of hazardous wastes,
- Reporting hazardous waste generation and maintenance of records,
- Duty of care to ensure waste is handled correctly by appropriate third parties.

It should be noted that there are very limited regulatory controls (until very recently with the introduction of IPPC) aimed at promoting hazardous waste avoidance and minimisation. Generally in Europe, the cost of proper management of hazardous wastes is very high (treatment and disposal costs range from 250$ per tonne up to 2000$ per tonne). This market force, combined with credible enforcement and deterrent sanctions, results in a strong desire to avoid and minimise hazardous waste generation.

Similarly, when it comes to hazardous wastes, few special measures have been implemented to promote reuse/recycling matters that are largely left to market forces.

Having said this there is a very strong hazardous waste reuse/recovery/recycling sector in Europe, hazardous wastes such as solvents, oils and metals (elemental and metal compounds). There are many specialist contractors specialising in solvent and oil waste recovery and there is an extremely strong cement sector using organic hazardous waste as subsidiary fuels.

In the Russian Federation and many CIS/NIS countries with transitional economies, poor enforcement and inadequate sanctions it has been common practice to set generation, treatment and disposal limits, ostensibly to promote avoidance and minimisation but also to raise fees and fines.

Table 2.2.3 shows the various controls implemented on waste generators (Source ISWA 1999).

Table 2.2.1 Approaches to Infrastructure Development

	Austria	Belgium	Croatia	Czech Republic	Denmark	Finland	France	Germany	Hong Kong
Year of Latest Data Update	1997	1997	1997	1997	1997	1997	1997	1997	1997
State Utility Company	No	No	No	-	Yes	Yes	No	Some states	Yes (6)
Provision of Facilities									
Private sector	Yes	Yes	- / New	Yes	No	Yes	Yes	Yes	(6)
Public sector	Yes	No	-	-	No	No	No	Yes	(6)
Public / Private collaboration	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes
Public investment	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes
Financial Support									
Indirect subsidy (of investment)	Yes	Yes	Not yet decided	Yes	Yes	Yes	Yes	Yes	Yes
Direct subsidy	No (5)	No	"	No	Yes	Yes	Yes (3)	No	Yes
Incentive levies / taxes	Yes	Yes	"	Yes	No	No	Yes	No	No

Source: ISWA (International Solid Wastes Association) 1999

(1) System not yet in place.
(2) No system at present.
(3) France has a system for the direct subsidy of prices charged by a facility, so long as its use is seen as the most appropriate treatment or disposal option for the particular waste in question.
(4) New landfill tax introduced in October 1996.
(5) Yes in some cases, if the emissions are lower than the standards.
(6) In effect, a government utility with services provided by a private company under contract to Government, selected by international competitive tender.
(7) Subsidy provided for the original state utility owned facility, which has now been privatised.
(8) Source: D.C. Wilson, Summary and Analysis of Hazardous Waste Management in ISWA Countries. In: International Perspectives on Hazardous Waste Management, edited by William S. Forester and John H Skinner, Academic Press, (1987).

Table 2.2.1 continued Approaches to Infrastructure Development

	Hungary	Italy	Japan	Netherlands	Norway	Spain	Sweden	UK	USA
Year of Latest Data Update	1997	1997	1987 (8)	1997	1997	1987 (8)	1997	1997	1997
State Utility Company	No	No	No	No	Yes	No	No	No	No
Provision of Facilities									
Private sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Public sector	No	Yes	Yes	Yes	No	No	Yes	No	No
Public / Private collaboration	Yes	Yes	Yes	Yes	Yes	(1)	Yes	Possible	No
Public investment	No	Yes	Yes	Yes	Yes	(1)	Yes	No	No
Financial Support									
Indirect subsidy (of investment)	Yes	Yes	Yes	Yes	Yes	-	(7)	No	No
Direct subsidy	No	No	No	No	No	-	No	No	No
Incentive levies / taxes	Yes	Yes	No	Yes	No	-	No	Yes (4)	Some states

Source: ISWA (International Solid Wastes Association) 1999

(1) System not yet in place.
(2) No system at present.
(3) France has a system for the direct subsidy of prices charged by a facility, so long as its use is seen as the most appropriate treatment or disposal option for the particular waste in question.
(4) New landfill tax introduced in October 1996.
(5) Yes in some cases, if the emissions are lower than the standards.
(6) In effect, a government utility with services provided by a private company under contract to Government, selected by international competitive tender.
(7) Subsidy provided for the original state utility owned facility, which has now been privatised.
(8) Source: D.C. Wilson, Summary and Analysis of Hazardous Waste Management in ISWA Countries. In: International Perspectives on Hazardous Waste Management, edited by William S. Forester and John H Skinner, Academic Press, (1987).

Table 2.2.2 Elements of National Regulation and Control Systems

	Austria	Belgium	Croatia	Czech Republic	Denmark	Finland	France	Germany	Hong Kong
Year of Latest Data Update	1998	1998	1997	1997	1998	1998	1998	1998	1998
Date of Main Legislation	1983, 1990	1981, 1985	1995	1991	1972, 1997	1978, 1994	1975	1972, 1996	1980, 1992
Registration/ Licensing (1)									
Collectors / Transporters	L	L, R	L	L	(2)	L	R	L	L
Treatment / Disposal Contractors	L	L	L	L	L	L	R	L	L (Waste producers R)
Control over Transport									
Manifest System	Yes	Yes	Yes	Yes	Yes	Soon	New	Yes	Yes
Control over Import	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control over Export	Yes	Yes	Yes	Yes	Yes	Yes	Soon	Yes	Yes
Permitting of Facilities									
Storage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Treatment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Disposal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Have all operating sites now been permitted?	Yes	Yes	Partly	Yes	Yes	Yes	Yes	Yes	Yes
Planning and Establishment of Facilities									
Is there a national strategy / plan?	Yes	Yes	Under preparation	Yes	Yes	Under preparation	No	No	Yes
Are authorities required to produce a plan?	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Has this been done?	Yes	Yes	Not yet	No	Yes	Yes	No	Yes	Yes
Old or Abandoned Hazardous Waste Sites									
Is there a national inventory?	Yes	Yes	Under preparation	Yes	Yes	Yes	Yes	Yes	Yes
Is there a clean-up programme?	Yes	Yes	No	No	Yes	Yes	(3)	(3)	Yes

(1) L= licensing scheme, implying investigation by the authorities; R= registration, implying simply being listed in a register.

(2) Mainly under the Trade Act, not under the Hazardous Waste Act.

(3) No formal nationwide clean-up programme, but clean-up of individual sites is continuously proceeding.

(4) All permits are going to be revised in the near future.

(5) Some regions (local authorities) have prepared a clean-up program.

Source: ISWA (International Solid Waste Association) 1999

Table 2.2.2 (continued) Elements of National Regulation and Control Systems

	Hungary	Italy	Japan	Netherlands	Norway	Spain	Sweden	UK	USA
Year of Latest Data Update	1998	1997	1987(9)	1998	1998	1998	1998	1998	1998
Date of Main Legislation	1981, 1996	1982, 1984	1970, 1979	1994	1994	1986, 1988	1975, 85, 95	1974, 1990	1976 (84)
Registration/ Licensing (1)									
Collectors / Transporters	L	R	L	L	Yes	(8)	L	R	L
Treatment / Disposal Contractors	R	R	L	L	Yes	L	L	Sites, not contractors	L
Control over Transport									
Manifest System	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Control over Import	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control over Export	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Permitting of Facilities									
Storage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Treatment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Disposal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Have all operating sites now been permitted?	Yes (4)	Yes	Yes	Yes	Yes	No	Yes	Yes (7)	Yes
Planning and Establishment of Facilities									
Is there a national strategy / plan?	Under preparation	No	No	Yes	Yes	Yes	Yes	Yes	No
Are authorities required to produce a plan?	No, but from 1997 onwards	Yes	Yes	Yes	Yes, locally	Yes	Yes, locally	Yes	(6)
Has this been done?	1997 onwards	No	Partial	Yes	Yes	Partial	Yes, locally	Not fully	Partial
Old or Abandoned Hazardous Waste Sites									
Is there a national inventory?	Partially	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Is there a clean-up programme?	Yes	No (5)	No	Yes	Yes	Yes	Yes	No	Yes

(6) Provincial or State Responsibility.

(7) Officially yes, but doubtless some gaps.

(8) Only the regulation of transport of dangerous goods

(9) Source: D.C. Wilson, Summary and Analysis of Hazardous Waste Management in ISWA Countries. In: *International Perspectives on Hazardous Waste Management*, edited by William S. Forester and John H Skinner, Academic Press, (1987).

Source: ISWA (International Solid Waste Association) 1999

Table 2.2.3 Controls on Waste Generators

	Austria	Belgium	Croatia	Czech Repub	Denmark	Finland	France	Germany	Hong Kong
Year Information provided	1998	1998	1997	1997	1998	1998	1998	1998	1998
1 Basic Requirements									
- know the waste	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- provide proper storage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- pack and label the waste	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- provide relevant compositional / safety data to transport & facility operators	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- obtain permits if required for on-site storage, treatment & disposal facilities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- to prepare a manifest to accompany each load of waste	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2 Registration Requirements									
- keep records	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- declare / register with authorities as a hazardous waste generator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- make regular reports to the authorities									
• on waste management	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
• on waste, treatment, disposal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
• frequency of reports	Report when	Annual	3 months	Annual	Annual	Annual	3 months	Annual	Monthly
3 Discharging the Responsibility									
- OK if waste transferred to a registered / licensed transporter	Yes	No	No	No	No	No	No	No	No
- Must also ensure waste is delivered to an appropriately licensed treatment / disposal facility	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Formal 'duty of care'	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Formal transfer notes required at each step	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Strict, 'contingent' liability for any environmental damage (even if waste is delivered to a licensed treatment / disposal facility)	No	Yes (Haz. Wast	No	No	No	No	Yes	Yes	No

Source: ISWA (International Solid Waste Association) 1999

Table 2.2.3 (continued) Controls on Waste Generators

	Austria	Belgium	Croatia	Czech Repub	Denmark	Finland	France	Germany	Hong Kong
Year Information provided	1998	1998	1997	1997	1998	1998	1998	1998	1998
4 Moving Waste Management up the Hierarchy'									
Statutory measures exist?									
• require proof that avoidance / minimisation or recycling / re-use not possible before granting permission for treatment / disposal of individual waste streams	No	No	No	No	No	No	No	Yes	No
• requirement to utilise the waste in-house or offer it for utilisation to a third party	No	No	No	Yes	No	No (2)	No	No	No
• requirement to send (monthly) reports to a Waste Exchange scheme	No	No	Yes	No	No	No	No	No	No
Requirement on industrial waste generators to prepare plans / audits?									
• prepare a waste management plan	Yes	No	No	No	No	No (3)	No	Yes	No
• prepare a waste management programme	No	No	No	Yes	No	No (3)	Yes	No	No
• undertake a waste audit	No	Yes	No	No	No	No (3)	Yes	Yes	No
• introduce a formal environmental management system (ISO 14000)	No	No	No	No	No (5)	No	No	No	No
`Voluntary' initiatives?									
• community 'right-to-know'	Yes	No	Yes	No	Yes	Yes	Do not know	Yes	Yes
• voluntary targets	Yes	Yes	Yes (1)	No	Yes	Yes	Do not know	Yes	Yes
5 Information Dissemination and Use									
Are there subsidised schemes available in your country to assist industry with their hazardous waste problems, through									
• an information clearing house?	Yes	No	Yes	No	Limited	No	Do not know	No	Yes
• provision of technical assistance?	Yes	No	Yes	No	No	No	Yes	No	Yes
• support for research and development?	Yes	No	No	Yes	Yes	No (4)	Yes	Yes	Yes
• support for demonstration projects?	Yes	Yes	Yes	Yes	Yes	No (4)	No	Yes	Yes

(1) Cleaner Production Programme
(2) Depends on the permit, some larger companies have to declare / register
(3) For some industries where required in permit, yes
(4) Special cases, yes
(5) Not yet, But probably some sort of ISO 9000 / 14000 in a few years.

Source: ISWA (International Solid Waste Association) 1999

Table 2.2.3 (continued) Controls on Waste Generators

	Hungary	Italy	Japan	Netherlands	Norway	Spain	Sweden	UK	USA
Year Information Provided	1998	n/a	n/a	1998	1998	1998	1998	1998	1998
1 Basic Requirements									
- know the waste	Yes			Yes	Yes	Yes	Yes	Yes	Yes
- provide proper storage	Yes			Yes	Yes	Yes	Yes	Yes	Yes
- pack and label the waste	Yes			Yes	Yes	Yes	Yes	Yes	Yes
- provide relevant compositional/safety data to transport & facility operators	Yes			Yes	Yes	Yes	Yes	Yes	Yes
- obtain permits if required for on-site storage, treatment & disposal facilities	Yes			Yes	Yes	Yes	Yes	Yes	Yes
- to prepare a manifest to accompany each load of waste	Yes			Yes	Yes	Yes	Yes	Yes	Yes
2 Registration Requirements									
- keep records	Yes			Yes	Yes	Yes	Yes	Yes	Yes
- declare/register with authorities as a hazardous waste generator	Yes			Yes	Yes	Yes	Yes	No	Yes
- make regular reports to the authorities									
• on waste management	-			Yes, (6)	Yes, bi-annual	Yes	Yes	No	Yes
• on waste, treatment, disposal	Yes			Yes, (6)	Yes, annual	Yes	Yes	No	Yes
• frequency of reports	Annual			Annual	See above	Annual	Annual	-	Annual
3 Discharging the Responsibility									
- OK if waste transferred to a registered/licensed transporter	Yes			No	Yes	No	Yes	No	No
- Must also ensure waste is delivered to an appropriately licensed treatment/disposal facility	Yes			Yes	No	Yes	Yes	Yes	Yes
- Formal 'duty of care'	Yes			Yes	No	No	No	Yes (7)	No
- Formal transfer notes required at each step	Yes			Yes	Yes	No	Yes	Yes	Yes
- Strict, 'contingent' liability for any environmental damage (even if waste is delivered to a licensed treatment/disposal facility)	Yes			(10)	Yes	Yes	No	No	Yes

Source: ISWA (International Solid Waste Association) 1999

Table 2.2.3 (continued) Controls on Waste Generators

	Hungary	Italy	Japan	Netherlands	Norway	Spain	Sweden	UK	USA
Year Information Provided	1998	n/a	n/a	1998	1998	1998	1998	1998	1998
4 Requirements/Initiatives to 'Move Waste Management up the Hierachy'									
Statutory measures exist?									
• require proof that avoidance/minimisation or recycling/re-use not possible before granting permission for treatment/disposal of individual waste streams	No			No	No	No	No	No	No
• requirement to utilise the waste in-house or offer it for utilisation to a third party	No			No	No	No	No	No	No
• requirement to send (monthly) reports to a Waste Exchange scheme	No			No	No	No	No	No	No
Requirement on industrial waste generators to prepare plans/audits?									
• prepare a waste management plan	Yes			(6)	Yes	No	No	No	No
• prepare a waste management programme	No			(6)	-	No	No	No	Yes
• undertake a waste audit	No			(6)	Yes	Voluntary	No	No	No
• introduce a formal environmental management system (ISO 14000)	No			(6)	No	Voluntary	No	No	No
`Voluntary' initiatives?									
• community 'right-to-know' legislation	No			Yes	Yes	Yes	Yes	No	Yes (8)
• voluntary targets	No			Yes	Yes	-	Yes	No	No
5 Information Dissemination and Use									
Are there subsidised schemes available in your country to assist industry with their hazardous waste problems, through									
• an information clearing house?	No			Yes	Yes	Limited	No	Limited	Yes
• provision of technical assistance?	No			Yes	No	Limited	No	Limited	Yes
• support for research and development?	No			Yes	Yes	Yes	No	No	No
• support for demonstration projects?	-			Yes	Yes	Yes	No	Limited	Yes

(6) In preparation
(7) Duty of care included in legislation and detailed guidance/code of practice issued
(8) The most formal and comprehensive approach the "Toxic Release Inventory" legislation requiring each factory to report annually on its use and discharge of toxic chemicals
(9) Large quantity generators must submit waste management plan
(10) Only if composition of waste differs from prior compositional data
Source: ISWA (International Solid Waste Association) 1999

2) Transportation and Manifest Systems

There is general consensus internationally on the need for systems to control the movement of hazardous wastes. In the UK, the first manifest system was introduced at the time that the first hazardous waste legislation appeared but in many other countries the manifest systems appeared later in the form of a second or subsequent step in the evolution of the overall regulatory control system for hazardous wastes. Indeed, in Japan, Sweden and Finland the manifest system has been introduced some 20 years later than the first hazardous waste management legislation.

Despite the consensus on the need for a manifest system and of detailed requirements being laid down for example in EU Directives, the detailed working of such systems still varies considerably between countries, as summarised in Table 2.2.4.

Hazardous waste management transportation has largely been undertaken by the operators of waste management and hazardous waste management facilities, be they wholly private sector or public-private sector partnership organisations.

Other controls over the transportation of hazardous wastes are the controls over transportation of hazardous goods, these apply equally to hazardous wastes.

Finally, the international movement of hazardous wastes is covered by the Marpol (Marine Pollution) Convention (Also Basle Convention, OECD Council Decision 1992, and Lome IV Convention). Signatory states have implemented regulations and control systems compliant with these Conventions. In the EC all these requirements are embodied by the Council Regulation (EEC) No 259/93 on the supervision and control of shipments of waste within, into and out of the EC.

Many European countries with more advanced hazardous waste management infrastructures actively import hazardous waste from some countries which do not have appropriate infrastructure.

3) Treatment and Disposal of Waste

Controls on the treatment and disposal of hazardous wastes have largely focused on the licensing or permitting of facilities. The two words “licensing” and “permitting” are generally taken to be synonymous but one differentiation that is used is to consider a “basic” authorisation which has a small number of “conditions” as a “permit” whereas a more complex authorisation incorporating many conditions as a “licence”. For example, a licence for a hazardous waste management incinerator in the UK may be a ten to twenty page document with very detailed technical and operational conditions incorporated.

In addition to the permit or licence, controls on the outputs from the facility may be exercised separately, e.g. effluent discharges and atmospheric emissions.

In addition to the basic permitting or licensing system, some countries legislation has provided a so called “power of direction” which enables regulators to specify the facilities where waste must be treated and or disposed of, where these powers have been included they have generally not been implemented.

The reverse, the prohibition of waste management by certain methods has been widely

included and implemented, for example the banning of disposal of liquid wastes in landfills.

Several European countries operate hazardous waste collections free of charge to the general public (wastes such as solvents, oils, photographic chemicals and asbestos). These services may also be provided at cost to charities. These services are generally provided by municipal authorities or by hazardous waste management services operated by public-private sector partnerships. Table 2.2.5 shows the types of controls typically on waste treatment and disposal facilities.

Table 2.2.4 Characteristics of National Manifest Systems

	Austria	Belgium	Croatia	Czech Republic	Denmark	Finland	France	Germany	Hong Kong
Year of Latest Data Update	1998	1998	1997	1997	1998	1998	1998	1998	1998
General									
Is there a manifest system?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date when introduced	1984	1976	1996	1991	1974/75 +1997	1997	1985	1978	1993
Record keeping									
Does identification form manifest accompany each shipment?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is manifest signed at each stage?	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Does each operator keep a register?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tracking of wastes									
Does controlling authority get a copy of every manifest?	Yes	No	Yes	Yes	Yes	No	No (1)	Yes	Yes
Does it receive copy in advance of shipment?	No	No	No	No	No	No	No	No	Yes
Are copies matched to track the waste?	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Is this done:									
- by generator who then notifies exceptions to the authorities?	No	No	No	-	No	No	Yes	Yes	Yes
- by the authorities?	Yes	No	Yes	Yes	No	No	No	No	Yes
- by central collection station?	No	No	No	-	Yes	No	No	No	-
Information									
- Are manifests used for statistical purposes?	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
- Is system computerised?	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes

(1) In France, the authority receives a periodical summary of manifests, primarily for statistical purposes.

Source: ISWA (International Solid Waste Association) 1999

Table 2.2.4 (continued) Characteristics of National Manifest Systems (Source ISWA - 1999)

	Hungary	Italy	Japan	Netherlands	Norway	Spain	Sweden	UK	USA
Year of Latest Data Update	1998	1997	1993	1998	1998	1998	1998	1998	1998
General									
Is there a manifest system?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date when introduced	1996	1985	1991	1980	1984	1988	1997	1981/96 Update	1980
Record keeping									
Does identification form manifest accompany each shipment?	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes
Is manifest signed at each stage?	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes
Does each operator keep a register?	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes
Tracking of wastes									
Does controlling authority get a copy of every manifest?	No (3)	No	-	Yes	Yes	Yes	No	Yes	Yes (7)
Does it receive copy in advance of shipment?	No	No	-	No	No	No	No	Yes (6)	No
Are copies matched to track the waste?	Yes	No	-	Yes	Yes	Yes	Yes	Partially	Yes
Is this done:									
- by generator who then notifies exceptions to the authorities?	No	No	-	No	No	Yes	No	No	Yes
- by the authorities?	Yes	No	-	Yes	Yes	No	No	Yes	Yes (7)
- by central collection station?	No	No	-	No	No	No	Yes	No	No
Information									
Are manifests used for statistical purposes?	Yes	No	-	Yes	Yes	Yes	Yes	Yes	No
Is system computerised?	Soon	No	-	Yes	Yes	-	(Yes)	Partially	No

(3) Authority gets only a summary of manifests in every quarter.
(4) Manifest system introduced under 1991 legislation, no detailed information supplied.
(5) System revised in 1996 for the third time since first implemented in 1981.
(6) Not for repeat loads, within 12 months, which meet certain criteria.
(7) In the USA, some states receive copies of every manifest and use them to check each shipment.

Source: ISWA (International Solid Waste Association) 1999

Table 2.2.5 Controls over Waste Treatment and Disposal

	Austria	Belgium	Croatia	Czech Republic	Denmark	Finland	France	Germany	Hong Kong
Year of Latest Data Update	1998	1998	1997	1997	1998	1998	1998	1998	1998
Direction of Waste									
To (a) particular site(s)	No	No	No (1)	Yes	Yes	No	No	Partial	Yes
To a particular option(s)	(1)	Yes	Yes	Yes	Yes	Yes	No	(1)	Yes
Powers exist, in reserve	Yes	Yes	Yes	-	-	-	Yes	Yes	-
Prohibition of Certain Options for Particular Wastes									
National regulations	Yes	Yes	Yes (1)	Yes	Yes	Yes	Yes	Yes	(1)
Control via Site Permits									
Strong national standards mean effective prohibition for certain waste	Yes	(2)	System not yet in place	Yes	Yes	Yes	Yes	(2)	Yes

(1) Recommendations are made in technical standards, but these are not mandatory.

(2) Strong controls exist in principle, but in practice there are wide local variations in what is / is not permitted at individual sites.

Source: ISWA (International Solid Waste Association) 1999

Table 2.2.5 (continued) Controls over Waste Treatment and Disposal

	Hungary	Italy	Japan	Netherlands	Norway	Spain	Sweden	UK	USA
Year of Latest Data Update	1998	1997	1987 (5)	1998	1998	1998	1998	1998	1998
Direction of Waste									
To (a) particular site(s)	Yes	No	No	Yes	Yes	No	No	(4)	No
To a particular option(s)	Yes	No	Yes	Yes	No	No	Yes	Rarely	Yes
Powers exist, in reserve	No	No	Yes	-	-	Yes	-	Yes	No
Prohibition of Certain Options for Particular Wastes									
National regulations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Reserve powers	Yes
Control via Site Permits									
Strong national standards mean effective prohibition for certain waste	(2)	Yes (3)	(2)	Yes	Yes	Yes	Yes	In some cases	Yes

(1) Recommendations are made in technical standards, but these are not mandatory.
(2) Strong controls exist in principle, but in practice there are wide local variations in what is / is not permitted at individual sites.
(3) Prohibition for asbestos and PCB.
(4) Powers exist but not usually done.
(5) Source: D.C. Wilson, Summary and Analysis of Hazardous Waste Management in ISWA Countries. In: *International Perspectives on Hazardous Waste Management* , edited by William S. Forester and John H Skinner, Academic Press, (1987).

Source: ISWA (International Solid Waste Association) 1999

2.3 Lessons / Recommendations for Romania

2.3.1 Waste Regulation and Control

Regulation and control are part of the fundamental requirements for a successful implementation of a waste management plan. Based upon legislation, regulations, standards and working guidance notes, implementation then requires effective enforcement with credible sanctions against infringements to achieve compliance. EU countries have sanctions which have true deterrent value, large fines, potential imprisonment and EU countries publicise successful prosecutions (`name and shame' policy).See also discussion in sections 2.2.1 1) and Tables 2.2.2 and 2.2.3

Information published by the UK EA for the year 2001/02 showed that in addition to **imprisonment of 7 persons** for environmental offences (all waste-related) the financial penalties for pollution and waste-related offences amounted to ~$5 million. This data is summarised in the table (2.3.1) below:

Table 2.3.1 UK EA Prosecutions and Fines for Pollution and Waste Offences (2001/02)

Charges brought	1563
Successful prosecutions	1474
% success	94.3
Fines collected	(GB£) 3,010,856
Average fine / charge	GB£ 2,042

Source: UK Environmental Agency

Other factors which have been of proven effect in the UK for enabling improved environmental and waste regulation and control include:

- Improved public awareness and access to information
- Fully integrated Environment Agency since 1996
- Adequate staffing (eg at the time of the formation of the UK Environment Agency (EA) in 1995 it comprised ~1000 staff in Waste Regulation Authorities, ~450 in the Pollution Inspectorate with responsibility for the more complex and seriously polluting sectors of industry, and ~7000 persons in the National Rivers Authority)
- Staff trained in management, technical and legislative matters (eg UK EA training budget ~US$7 million per year)
- Targeted approach to Inspection based on Operator and Pollution Risk Appraisal (OPRA)
- National Waste Survey to generate Strategic Waste Management Assessments, benchmarking waste generation rates with industry sectors and inform waste minimsation programmes
- Documented enforcement and effective prosecution policy (see opening paragrah above)
- Laboratory accreditation for environmental monitoring sampling and testing
- Application of principle of cost recovery to EA's charging schemes (eg 90% of UK EA receipts are provided from charging schemes and flood defence levies
- Annual Corporate Action Plan with goals, and half-yearly Performance Reviews of each of the operational activities: Licensing, Inspection, Enforcement, Environmental improvements, Emergency response, Planning and Information.

Key controls over waste generation, transportation, treatment and disposal implemented widely in Europe focus on:

- Registration and permitting of waste generators
- Identification and classification of wastes
- Producer responsibility and Duty of Care
- Record keeping
- Registration, permitting or licensing of carriers of hazardous wastes,
- Manifest systems controlling individual movements of hazardous waste, and
- Permitting or licensing of facilities which use, recycle, treat or dispose of hazardous wastes.

In the UK, the private sector invested in hazardous waste incineration some years ago (1973) on the basis of a market survey that identified significant volumes of wastes suitable for incineration. Unfortunately, the permitting system continued to allow combustible wastes to be landfilled and there was an unwillingness by companies to pay for incineration costs; the companies operated at a loss for several years until landfills were no longer permitted to accept these wastes.

2.3.2 Waste Generation, Avoidance and Minimisation

As indicated in the forgoing text, avoidance and minimisation has been practiced more widely in Europe due to market forces, i.e. the high cost of proper hazardous waste management. As the cost of hazardous waste increases in Romania the waste generators, facing increasing costs, will be keen to avoid and minimise waste generation. It is important that the capability for undertaking effective avoidance and minimisation projects continues to be developed in Romania to meet this market need once stimulated.

In the short-term, the Government and NGOs should continue to promote and support waste avoidance and minimisation projects.

2.3.3 Waste Treatment and Disposal

Given the economic situation in Romania and the existing poor waste management practices is necessary to remove the barriers to development of improved waste management facilities. In the current context in Romania, particularly the limited capability to provide economic support to facility development, and based on European and Japanese experience it is necessary to:

- Rapidly implement realistic controls and standards for improved waste management,
- Apply those standards in fair and equitable manner, particularly aiming initially at preventing some of the wholly inappropriate practices common today,
- Provide affordable economic incentives for facility development,
- Provide stronger economic disincentives for poor practices (sanctions with deterrent effect).

Identify organisations already involved in waste management and encourage them to further invest and develop the first generation of centralised / regional treatment facilities. For the management of organic wastes this should maximise the use of cement kilns for waste management. For inorganic hazardous wastes this should promote the development of new

infrastructure at existing waste management sites or new waste management sites.

The aim would be to "grow" the infrastructure system from small regional beginnings rather than try to develop large, strategic National facilities.

The European and world experience indicates that the other successful route is via forming public-private sector partnership to develop a regional strategic facility. The public sector partner may be national, regional or municipal.

It cannot be stressed enough that, for this to be successful, the parallel development and enforcement of regulatory controls is essential.

2.3.4 Contaminated Sites

It is common practice in European countries and Japan to have a policy specifically dedicated to the management of contaminated sites and to launch inventory and database **works as the starting stage**. There is no comprehensive inventory of contaminated sites or evaluation of their environmental impacts in Romania. Most inventories have been produced for surface water pollution sources within the scope of the prevention of pollution of the Danube river.

In the UK, Part IIA of the 1990 Environmental Protection Act, as introduced by Section 57 of the 1995 Environment Act, specifically defines contaminated land as '….any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances, in, on or under the land that

- Significant harm is being caused or there is a significant possibility of such harm being caused, or
- Pollution of controlled waters is being or likely to be caused

In this context 'harm' is defined as: 'harm to the health of living organisms or other interference with the ecological systems of which they form a part, and in the case of man includes harm to his property.' Controlled waters include groundwaters as well as rivers and lakes, etc.

Three of the most important lessons / recommendations for Romania are to take steps:

- Stop creating new contaminated sites, and
- Prevent access to those sites where risk of acute health effects
- Create an inventory of historical sites and operating sites (with potential for pollution) for the deposit of hazardous waste and to assess the conditions of risk potential of soil and groundwater contamination

Fixed, generic and/or other limit values do not play a role in decision making in the UK; legislation does not provide for different levels or stringencies of risk assessment. The approach is based on the Source-Pathway-Receptor principle and the need to establish the relationships between these three components. The nature of these relationships controls the degree of risks and decisions on whether the risk is sufficiently serious to warrant action. Remedial actions should be directed at controlling, modifying or destroying these Source- Pathway-Receptor relationships that present unacceptable risks.

A wide variety of different criteria may be applicable in assessing the actual or potential

risks associated with land contamination to health and the environment. The UK has chosen to develop guideline values rather than standards, for the assessment of risks within the overall policy context of ensuring that land is 'suitable' for its actual or intended use. This allows the incorporation of qualified professional judgement in the interpretation of assessment findings, and for consideration of the nature and magnitude of the risks, technical uncertainty and the practicality and costs of dealing with contamination, when deciding upon the 'acceptability' of risk or of risk estimates in individual cases.

The guiding principle in the United Kingdom is 'fit for purpose'. The planning and development control system will consider the intended future use of a development together with the wider environmental questions. In practice, most remediation is secured voluntarily or through the Town and Country Planning system. Specific conditions may be attached to planning approval to require the implementation of a remedial design or construction measures necessary, either to ensure that the planned development and surroundings are safe in terms of any risks presented by land contamination, and/or, to prevent the development itself from causing unacceptable risks (for example by introducing a susceptible receptor, or a pathway linking an existing source with a receptor).

The majority of on-site remediation processes are required to be operated under a Mobile Plant Licence, which sets out general controls on the plant/process which are applicable under all circumstances. The UK Environment Agency has a policy which promotes the use of sustainable remediation solutions. Where the Agency is in a position to influence the choice of solution, it will seek to promote treatment technologies above disposal options, provided the solution is cost effective.

Finally, in the UK it should be recognised that the Private Sector drive and fund the majority of development and remediation, and consequently they will have a major influence on how land is re-used and the form of the remediation.

Reference:

[1] Battery Association Japan
[2] Hiroshi UCHIKAWA, "*Cement and Concrete Industry Orienting Toward Environmental Load Reduction and Waste Recycling*", The International Conference of IUPAC, 1996 in Seoul, Korea)
[3] Ministry of Economy, Trade and Industry
[4] Ministry of the Envuronment, "*Minamata Disease The History and Measures*", (http://www.env.go.jp/en/topic/minamata2002/index.html),2002
[5] Kankyo Shisetu No86, 2001
[6] "IPCS Environmental Health Criteria No.101 Methylmercury",etc.
[7] "Nihon no Kogai Keiken"Japan's Experience with Pollution, 1991

Annex 3

List of Reference Documents, Reports and Books in Connection with Hazardous Waste Management

Annex 3 List of Reference Documents, Reports and Books in Connection with Hazardous Waste Management

The following table lists websites, books, and reports which have relevance to hazardous waste management, and may be useful for Romania.

Category:

A: Internet Website
B: Book
C: Documents or reports

List of Websites, Reports, and Books in Connection with Hazardous Waste Management, and Maybe Useful for Romania

No.	Cate-gory	Author	Title	Publisher or Internet URL
1	A	European Union	CELEX (Communitatis europeae lex) is the official legal database of the European Union.	http://europa.eu.int/celex/htm/celex_en.htm
2	A	European Union	European Union Publications Office	http://publications.eu.int/general/en/index_en.htm
3	A	European Union	EU Environment Web Pages	http://europa.eu.int/comm/environment/index_en.htm
4	A	European Environment Agency	Soil contamination reports	http://themes.eea.eu.int/Specific_media/soil
5	A	World Bank	Pollution Prevention and Abatement Handbook (PPAH)	http://wbln0018.worldbank.org/essd/essd.nsf/Docs/TOC?OpenDocument
6	A	UNEP Division of Technology Industry and Economics	International Environmental Technology Centre Publications	http://www.unep.or.jp/ietc/Publications/
7	A & C	UNEP / ISWA	Training Resource Pack for hazardous waste management in developing economies	http://www.earthprint.com
8	A	UNEP	The Basel Convention Web Site (Publications)	http://www.basel.int/pub/pub.html
9	A	UNEP	Searchable directory for Environmentally Sound Technology (EST).	http://www.unep.or.jp/maestro2/
10	A	Global Environment Centre Foundation, UNEP	On-site Green Technique	http://nett21.unep.or.jp/CPT_DATA/English/index-e.html
11	A	GEC / UNEP	Database of Waste Treatment Technology in Japan	http://nett21.unep.or.jp/CTT_DATA/index_waste.html
12	A	UNEP	UNEP information on clean technology and assessment of risks from mining operations	http://www.unepie.org/pc/mining/publication/tech_rep.htm
13	A	Basel Convention	Basel Convention Guidelines on Specially Engineered Landfill (D5)	http://www.unepie.org/pc/mining/publication/tech_rep.htm

No.	Cate-gory	Author	Title	Publisher or Internet URL
14	A	Basel Convention	Technical Guidelines on Hazardous Waste: Waste Oils from Petroleum Origins and Sources (Y8)	http://www.unepie.org/pc/mining/publication/tech_rep.htm
15	A	Basel Convention	Technical Guidelines on Used Oil Re-refining or Other Re-uses of Previously Used Oil (R9)	http://www.unepie.org/pc/mining/publication/tech_rep.htm
16	A	European Chemical Bureau	Information on a range of chemicals and will hold a current copy of Annex V testing methods.	http://ecb.ei.jrc.it/
17	A	European Topic Centre for Waste		http://waste.eionet.eu.int/
18	A	European Bureau for IPPC		http://eippcb.jrc.es/pages/FAbout.htm
19	A	Scottish Environmental Protection Agency website: waste minimisation section	Overview of Best Practice techniques, many taken from Envirowise	http://www.sepa.org.uk/wastemin/top-tips/
20	A	Eur-Lex	European legislation: existing and proposed. Free downloads of EU Directives available in most EU languages	http://europa.eu.int/eur-lex/en/map.html and http://europa.eu.int/comm/environment/waste/index.htm
21	A	PERICLES	Protocol for the evaluation of residues in industrial contaminated liquid effluents being funded by the European Commission DG 12	http://www.irfmn.mnegri.it/ambsal/chem-toxi/pericles.htm
22	A	Envirowise	An ongoing support service for waste minimisation and best practice techniques for different industrial sectors. Best practice guidance notes, case studies and reviews of technology are available from their website. The site is sponsored by the UK government, but operated by independent consultants.	http://www.envirowise.gov.uk/
23	A	Schnoor, J. L. (1997)	Phytoremediation	http://www.gwrtac.org
24	A	OECD website	This page gives links to a number of other organisations including the UNEP waste minimisation information site which links to programmes in a range of countries	http://www.oecd.org/env/efficiency/wastemini.htm
25	B	ERM	Hazardous Waste Management`	ISBN: 0-07-019717-2
26	B	World Bank	The Safe Disposal of Hazardous Wastes	ISBN: 0-8213-1144-1
27	B	Brunner ISBN 0-07-008598-1	Hazardous Waste Incineration	McGraw-Hill Inc
28	B	Theodore & Reynolds ISBN 0-471-84976-6	Introduction to Hazardous Waste Incineration	J Wiley & Sons
29	B	K.Probst and T.Beierle	The Evolution of Hazardous waste Programs: Lessons from Eight Countries	Resources for the Future, 1999

No.	Cate-gory	Author	Title	Publisher or Internet URL
30	B	S. Aoyama et al	Japan's Experience in Urban Environmental Management	World Bank 1994
31	B	D. Pearce and J. Warford	World Without End: Economics, Environment and Sustainable Development	World Bank/Oxford U.P., 1993
32	C	ISWA	ISWA Working Group on Hazardous Wastes – International Perspectives 1999 Report	
33	C	MARPOL / ERM	Global Waste Survey	
34	C	Magda Lovei	Environmental Funds	World Bank, 2001
35	C	W. Cruz et al	Urban and Industrial Management in Developing Countries: Lessons from Japanese Experience	World Bank, 1999
36	C		Voluntary Approaches for Environmental protection in the European Union, OECD December 1998	OECD, 1998
37	C		Economic Instruments for Pollution Control and natural Resources management in OECD Countries: A Survey, OECD 1999	OECD, 1999
38	C	D. Williams and J. Warford	Donor Strategies and Methodologies for Promoting Cleaner Production in Developing Countries	JICA, 2002