

## Draft

### “National Hazardous Waste Management Strategy”

#### Executive Summary

#### Objective :

1. Effective management of hazardous waste, so as to avoid environmental pollution and adverse health effects due to its improper handling & disposal.
2. To have an appropriate strategy for the regulatory bodies, generators of hazardous waste, its recyclers and operators of facilities to minimize, recycle, treat and dispose of left over hazardous waste in an environmentally sound manner.
3. To facilitate implementation of the action plan brought out in “National Environment Policy 2006” on management aspects of hazardous waste, and to fulfil obligations under the Basel Convention on Transboundary movement of hazardous wastes including their minimization environmentally sound management and active promotion of transfer and use of cleaner technologies.

#### Proposed Actions :

(i) Inventory of hazardous waste generation :

Currently there are about 30,000 industries generating hazardous waste of the order of 6 Million Tonns per annum in the country. Since industries change their products, processes and capacity of production, and new industries get established periodic, updation of inventories is required. It should be made mandatory on the part of industries to report changes/additions in hazardous waste generation and steps taken to reduce generation of waste per unit of production. As per the Hazardous Waste regulations, industries are required to store hazardous waste for a period not exceeding 90 days and shall maintain a record of sale, transfer, storage, recycling and reprocessing of such wastes unless the concerned State Pollution Control Board has extended the stipulated period. The waste could either be recycled /reused or disposed of in captive or common Treatment, Storage and Disposed Facilities (TSDF) available in the state, or be incinerated. Inventories of ‘end of life’ consumer products such as e-waste are also required to be made.

**( ii ) Waste avoidance and waste minimization at source:**

In the hierarchy of waste management, waste avoidance and waste minimization have to be attempted first, for which dissemination of information on technological options should be a continuing exercise.

Promote implementation of recovery of resources such as solvents, other reagents and by-products as well as re-generation of spent catalysts in a time frame manner.

**( iii ) Reuse, recovery and recycling of hazardous waste:**

Industrial associations/industries should explore options/ opportunities of reusing, recovery and recycling of hazardous waste in an environmentally sound manner.

**( iv )** Establishment of 'Waste exchange Banks/ Centers' should be encouraged to provide information on wastes and promote reuse, recovery and recycling technologies which upscale the quality of resource recovery.

**( v )** Incentivise re-processors with state-of-the-art facilities to meet CPCB guidelines & beyond.

**( vi )** Introduce payback scheme as part of extended corporate responsibility in case of lead-acid batteries.

**(vii)** Develop a system for channelising of wastes containing toxic metals for recovery, such as mercury from thermometers and fluorescent tube lights, cadmium from batteries etc.

a) **E-waste:**

The recycling of e-waste is required to be regulated due to presence of hazardous constituents in the components of waste electrical and electronic assemblies. State Governments should encourage e-waste recycling projects under public-private partnership mode.

b) **Safe disposal of hazardous waste:**

For the waste which cannot be recycled/ reused, safe and environmentally sound disposal should be adopted depending upon waste category. Design and operation norms of disposal facilities should be strictly adhered to as per the guidelines framed by CPCB. Supervision of such facilities by concerned SPCB during construction stage is required to ensure quality of construction as per guidelines, including post closure monitoring.

**Setting up of common Treatment, Storage and Disposal Facilities:**

Currently, only 12 states have 25 operating common hazardous waste Treatment, Storage and Disposal Facilities (TSDFs). In addition, 35 notified sites covering other states are at various stages of development. In view of the difficulties encountered in identifying suitable sites, setting-up of TSDFs should be considered within industrial estates. The State Governments may consider providing financial support matching the Central subsidy.

A separate Escrow fund should be created by the facility operator for post closure monitoring and to deal with liability arising due to mishaps, calamities etc.

The TSDFs shall cater to meticulously delineated hazardous waste catchments areas taking into consideration their distance from the

generators and availability of wastes. SPCBs shall ensure that in a given hazardous waste catchments area, there are no multiple operating TSDFs.

### **Interstate transportation of hazardous waste:**

Based on mutual consultations and agreement between the State Governments, interstate movement of hazardous waste should be permitted, in particular, to take care of difficulties faced by some States in development of TSDFs, such as not having viable quantities of hazardous waste, particularly

- The SPCBs/PCCs should develop on-line tracking system for movement of hazardous waste from generation to the disposal/recovery/ recycle stage.

### **Use of cement kilns for hazardous waste incineration:**

As the field trials conducted by CPCB have indicated, compliance of notified emission norms for hazardous waste incinerators, use of hazardous wastes (such as ETP sludge from dyes & dye intermediates, tyre chips, paint sludge, Toluene-Di-Isocyanate tar residue and refinery sludge) as supplementary fuels in cement kilns need to be promoted.

Reuse of hazardous waste, however, such as in case of paint sludge after reconditioning as primer/ coating in some automobile manufacturing units, which has been successfully demonstrated, is a preferable option over co-incineration and should be encouraged.

### **Illegal dump sites and remediation:**

To take care of illegal dumping, surveillance both by enforcement agencies and industry associations needs to be stepped up.

The approach for site remediation of dump sites would vary from site to site depending on nature of pollutants, future damage potential and remedial cost. The remediation strategy should focus on The 'polluter

pays principle' which needs to be strictly enforced. In such a case, the polluter has to reinstate

or restore the damaged or destroyed elements of the environment at his cost. To take care of cases of remediation wherein polluters are not traceable, a dedicated fund needs to be created by SPCB/ PCC.

**Strengthening the infrastructure of regulatory bodies:**

For effective enforcement of regulations, SPCBs/ PCCs have to be strengthened in terms of manpower, equipment, instruments and other infrastructure facilities. The Central and State Governments may support SPCBs/ PCCs by adequate funding, training and awareness programmes, periodically.

Cases of illegal imports of hazardous waste indicate the need to plug existing loopholes. Priority areas for action include harmonization of EXIM regulations with the provision of H.W. (M, H. & T.M.) Rules, training of Custom Department personnel engaged in inspection & sampling and also up-gradation of Customs Department laboratories.

**Disposal of date expired drugs & pesticides:**

In order to deal with such hazardous wastes, inter-state transportation as well as disposal in a facility as per following options should be permitted:

- c) To have these processed wherever possible by the industry which supplied them.
- d) To appropriately incinerate either through dedicated incinerators of individual industries or through incinerators available with common facilities (TSDFs).

**Handling and management of hazardous waste during ship dismantling:**

Adequate safety systems and procedures need to be adopted during dismantling of ships and handling of hazardous wastes/ materials (such as used oil, waste oil, asbestos containing panels/ tiles, damaged asbestos containing material, paint chips, and used chemicals like acids etc.)

This activity is required to be regulated through State Maritime Boards, SPCBs and factory Inspectorates as per the comprehensive code of Ministry of Steel.

[DRAFT AS ON 02.12.2008]

## **NATIONAL HAZARDOUS WASTE MANAGEMENT STRATEGY**

### **1. Introduction**

Hazardous Waste, bulk of which is generated by the industries, can cause environmental pollution and adverse health effects if not handled and managed properly. Its effective management, with emphasis on minimization of generation and recycling/ reuse, taking into account economic aspects, is therefore essential. With this objective, it is felt necessary to have an appropriate strategy for the regulatory bodies, generators of waste, recyclers and operators of the facilities to minimize, recycle, treat and dispose of hazardous waste in an environmentally sound manner.

Various actions have been taken for environmentally sound management of hazardous wastes in the country. These include establishing regulatory and institutional framework, preparation of technical guidelines, development of individual & common facilities for recycle/recovery/reuse, treatment and disposal of hazardous wastes, inventory of hazardous wastes generation, identification & assessment of dump sites for the purpose of preparing remediation plans, and creating awareness amongst various stakeholders. However, these activities need to be expanded, reinforced and strengthened.

The overarching objective of this strategy is to reach the goal of “Zero Disposal of Hazardous Waste”, adopting a holistic approach encompassing reduction at source, reuse, recycle and recovery- in that order- through infusion of cost-effective innovative technologies, processes, and practices.

Further, the management of ‘end of life’ consumer products, having hazardous constituents, such as used lead acid batteries, waste electrical & electronic equipment etc., must give primacy to reuse, recycling and recovery.

Hazardous waste which is not amenable to reuse, recycling and recovery has to be subjected to physico-chemical/ biological treatment, incineration or disposal in the secured landfill.

The Strategy also addresses the issue of import of recyclable, recoverable or reusable hazardous waste not only to meet the growing needs of certain

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materials like non-ferrous metals but also to reduce negative environmental footprints. Import of hazardous waste from any country to India for disposal shall not be permitted.

The hazardous waste management strategy incorporates the essence of the 'National Environmental Policy 2006', relevant multilateral environmental agreements like Basel Convention and the National Regulations.

## **2. National Environment Policy**

The "National Environment Policy 2006" has brought out management aspects of hazardous wastes in the form of an action plan which includes:

- Develop and implement viable models of public-private partnerships for setting up and operating secure landfills, incinerators and other appropriate techniques for the treatment and disposal of toxic and hazardous waste, both industrial and bio-medical, on payment by users, taking the concerns of local communities into account.
- Develop and implement strategies for cleanup of toxic and hazardous waste dump legacies, in particular in industrial areas and abandoned mines, and reclamation of such lands for future sustainable use.
- Survey and develop a national inventory of toxic and hazardous waste dumps and an online monitoring system for movement of hazardous wastes. Strengthen capacities of institutions responsible for monitoring and enforcement in respect of toxic and hazardous wastes.
- Strengthen the legal arrangements and response measures for addressing emergencies arising out of transportation, handling and disposal of hazardous wastes, as part of the chemical accidents regime.

- Give legal recognition to, and strengthen the informal sector systems of collection and recycling of various materials. In particular enhance their access to institutional finance and relevant technologies.
- Develop and enforce regulations and guidelines for management of e-waste, as part of hazardous waste regime.

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### **3. Basel Convention**

India, being a Party to the Basel Convention on trans-boundary movement of hazardous wastes, is required to fulfil its objectives regarding control and reduce trans-boundary movements of hazardous wastes. Other objectives of the Convention include prevention and minimization of generation of such wastes, their environmentally sound management and active promotion of the transfer and use of cleaner technologies.

### **4. Regulatory Frame Work**

To regulate management of Hazardous Waste generated within the country as well as export/import of such waste, the Hazardous Wastes (Management and Handling) Rules, 1989 were notified under the Environment (Protection) Act, 1986. Any waste, which by virtue of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances has been defined as hazardous. These rules were amended in 2008 to bring greater clarity to classification of hazardous wastes by linking generation of waste streams to specific industrial processes. Simultaneously, threshold levels for concentration of specified hazardous constituents in wastes were laid down to distinguish between hazardous and other wastes. For regulating imports and exports, wastes had been classified as either 'banned' or 'restricted'. The procedure for registration of recyclers/re-processors with environmentally sound management facilities for processing waste categories, such as used lead acid batteries, non-ferrous metals waste and used/waste oil, has also been laid down.

The new Rules titled 'Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008' have been notified superseding the earlier regulation. Recycling of e-waste has also been addressed under these Rules.



The management and handling of Bio-medical wastes as well as used lead acid batteries are regulated under separate Rules made for the purpose.

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## **5. Categories of Hazardous Waste**

This strategy encompasses the following categories of hazardous waste:

- a) Industrial wastes (hazardous) generated during production such as rejects/process residues, spent chemicals/solvents, spent catalysts, hazardous dust collected from air pollution control devices, sludge arising from waste water treatment plants etc.,
- b) Date-expired products such as obsolete pesticides and medicines,
- c) Discarded products such as fluorescent bulbs and tubes containing mercury, used batteries etc.,
- d) E-waste,
- e) Hazardous waste from demolition including ship breaking activities,
- f) Used oil/waste oil, and
- g) Used Lead Acid Batteries.

Other types of hazardous waste, not included in this strategy, are radio-active waste and bio-medical/infectious waste which are covered under separate relevant regulations.

The high volume low effect wastes such as fly ash, phosphogypsum, red mud, slags from pyrometallurgical operations, mine tailings and ore beneficiation rejects are excluded from the category of hazardous waste. However, management of these wastes shall be as per the guidelines issued by regulatory authorities from time to time. These guidelines should emphasize utilization of these wastes to the maximum extent.

## **6. Hazardous Waste Generation**

The inventory of hazardous waste generating industries and hazardous waste generated has been prepared out by the State Pollution Control Boards (SPCBs) in the States and Pollution Control Committee (PCCs) in the respective Union Territories (UTs). Currently, there are around 30,000 industries generating hazardous waste of the order of 6 Million Tonnes per annum.

The inventory has also brought out detailed information on quantum of waste in terms of recyclable, reusable, landfillable and incinerable

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components. Such information facilitates better planning of common facilities for treatment and disposal.

The experience of industrially developed nations indicates that 1 % increase in the Gross Domestic Product (GDP) leads to 1 to 3 % increase in generation of hazardous waste. Given the fact that the GDP growth in India is rapidly accelerating, it can be reasonably projected that the hazardous waste generation in the country would increase. This strategy, therefore, acquires even more significance in the context of efforts to reduce hazardous waste generation.

Since the industries do change their products, processes, or capacity of production and as new industries get established, there is a need to periodically update inventories by the SPCBs/PCCs. Besides, it should be made mandatory on the part of industries to report changes / additions in hazardous waste generation and the steps taken by them to reduce generation of waste per unit of production.

As per the Hazardous Waste Rules, industries have to store hazardous waste properly, and in accordance with authorization issued by SPCBs/PCCs. The waste recycled either has to be reused or disposed in captive or common Treatment, Storage and Disposal Facility (TSDF) if available in the State, or incinerated in a captive incinerator of its own, or in a common TSDF having incineration facility, based on type of waste.

So far as the 'end of life' consumer products are concerned, no detailed inventory has been prepared, except for some rough estimates in respect of the e-waste. These are bound to increase in volume as the economy grows.

## **7. Components of Hazardous Waste Management Strategy:**

### **a). Waste Avoidance and Waste Minimization at Source:**

In the hierarchy of waste management, waste avoidance and waste minimization have to be attempted first. This requires a close look at the processes generating hazardous waste was to incorporate feasible modification in processes, technologies and plant practices.

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Dissemination of information on technological options for waste avoidance and minimization should, therefore, be a continuing exercise. Whenever switch-over to cleaner processes involves substantial investments and import of machinery/technology, suitable financial incentives in the form of rebate in customs duty, etc need to be considered.

In the chemical industry, in particular, assessment of cleaner technologies needs to be taken up in major segments such as pesticides, dyes and bulk drugs, and their intermediates. In all such industries, wherever laboratory scale trials have been completed, setting-up of pilot/demonstration plants needs to be encouraged through suitable incentives. This would enable speedier adoption of cleaner technologies by the industry.

In cases, where techno-economic feasibility of cleaner production process has been well-established and these have been already adopted by some industrial units, such as cyanide free electroplating, a dialogue should be initiated by the concerned agencies of Central/State Governments with the industry associations for switch over to cleaner production options within a specified time period.

In the petrochemicals, bulk drug, pesticides and dye & dye intermediates sectors, product-wise opportunities available for recovery of resources, such as solvents, other reagents and by-products as well as re-generation of spent catalysts, have been well documented and need to be implemented within a specified time frame. The time

frame may be fixed by the regulatory authorities in consultation with the concerned industry associations.

In order to assess the current technological status in different industrial categories and preparing action plans for phasing in cleaner production processes/technologies, MoEF may constitute dedicated Task Forces comprising of experts in the concerned field.

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**b). Reuse, Recovery and Recycling of Hazardous Waste:**

Second in the hierarchy of waste management is reuse, recycle and recovery of useful resources from wastes, in that order. MoEF may, therefore, consider constituting dedicated waste specific Task Forces so as to explore options/opportunities of reusing, recovery and recycling of the hazardous wastes in an environmentally sound manner.

Further, to promote reuse, recovery and recycling of hazardous wastes, establishment of 'waste exchange banks/centres' should be encouraged jointly and severally by MoEF and State Governments with financial assistance. These banks/centres should not only provide information on wastes but also promote reuse, recovery and recycling technologies which up-cycle the quality of resource recovery rather than down-cycle it.

For example, recycling of non-ferrous metal wastes (zinc dross, brass dross, used lead acid batteries, copper oxide mill scale etc) offers attractive options for resource recovery. Current gap between demand and supply of lead, zinc and copper as well as the projected widening of the gap due to rapid increase in demand arising from growth in the various sectors, serves as incentive for recycling of such wastes. As compared to primary production of metals, recycling is energy efficient and environment friendly

and hence, needs to be promoted. The recycling of used lubricating oil is another example of resource conservation.

At present, there are about 800 recyclers of non-ferrous metal wastes/used oil/ waste oil registered under the Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008. The capacity registered for re-refining/ recycling of used oil & waste oil is about 1.2 Million KLA; that for non-ferrous metal wastes other than lead is 1.3 Million Tonnes per annum and for lead based waste is about 0.75 Million Tonnes per annum. Registrations have been granted to units based on their processing facilities for environmentally sound re-processing technologies. Barring a few large facilities, recycling takes place essentially in the small-scale sector. As such, there are limitations on technology up-gradation necessary to ensure re-processing in an efficient manner.

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In order to promote technology up gradation, it would be necessary to incentivize re-processors with state-of-the-art facilities which not only meet the CPCB guidelines but go beyond. One such incentive could be the preferential access to imports of non-ferrous metal wastes and other wastes requiring MoEF permission to only those recyclers employing state-of-the-art facilities. To examine the cases of preferential access to import, MoEF may assign the task to the 'Technical Review Committee' comprising of experts.

Despite the registration scheme for recyclers, recycling in the unorganized sector with all its attendant environmental and health hazards is reported to continue. This underscores the importance of channelization of wastes generated. While the Battery (Management and Handling) Rules 2001, mandate return of used lead acid batteries, compliance remains unsatisfactory. It would be necessary to extend the corporate responsibility concept to the producers, for instance, in the form of a buyback scheme.

At present, there are no environmentally sound re-processing facilities in the country to recover toxic metals such as mercury from thermometers, fluorescent tube-lights etc, and cadmium from batteries. Considering the potential for serious health impacts posed

by co-disposal of such hazardous wastes with municipal solid wastes, development of a system for channelization of such wastes and setting up of facilities for their re-processing deserves to be accorded high priority.

**c). E-Waste (Electrical and Electronic Equipments/Assemblies)**

The recycling of e-waste such as components of waste electrical and electronic assemblies comprising accumulators and other batteries, mercury- switches, activated glass cullets from cathode- ray tubes and other activated glass and PCB capacitors etc. is also required to be regulated due to the presence of hazardous constituents. The guidelines in this regard have already been issued so as to ensure environmentally sound recycling of e-waste.

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The producers of electronic equipment may be required to have a centralized facility for e-waste of their brand as extended producer responsibility. In such cases, the import and export of e- waste would become necessary and should be allowed if the facility has environmentally sound processing technology. Even in case of a facility created for indigenous e-waste, a minimum scale of operation for environmentally sound processing technology is essential thereby requiring sufficient e- waste for processing. For such facilities, import of e-waste may be considered. The export of e-waste may be allowed in the event of non-availability of environmentally sound recycling facilities. The State Governments should encourage e-waste recycling projects under the public-private-partnership mode.

**d). Safe disposal of hazardous waste**

Waste which cannot be reused or recycled has to be disposed of in an environmentally sound manner. Depending on the waste category, physico-chemical/bio-logical treatment, secured land disposal, incineration or any other mode of safe and environmentally sound disposal should be adopted. Design and operational norms of

such facilities, either captive or common should strictly adhere to the guidelines framed by the Central Pollution Control Board. Supervision of such facilities during construction stage would be necessary to ensure quality of the construction of the disposal facilities as per guidelines of Central Pollution Control Board. Post-closure monitoring of the disposal facilities would also be necessary. A separate escrow fund needs to be created for this purpose. Common facilities shall invariably be equipped with laboratory facilities to verify waste characteristics so as to decide upon treatment and disposal options including secured land filling or incineration.

#### **8. Setting-up of the Common Treatment, Storage and Disposal Facilities:**

Currently there are 25 Common Hazardous Waste Treatment, Storage and Disposal Facilities in operation in 12 States. In addition to this, 64 sites have been identified and 35 sites have been notified for setting up of the disposal facilities. The notified sites are at different stages of development. The annual capacities of the TSDFs range from 10,000 T/annum to 1.2 lakhs T/annum with an operating life span of 15-30 years.

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Common facilities including integrated facilities have to be planned following the polluter-pays principle although, at the initial stages, a certain level of assistance from the State Governments could significantly accelerate the process of setting up of these facilities and also ensure their viability in the initial years which is vital. Several State Governments have made available land at concessional rates for setting up of these facilities, which form part of the State's industrial infra-structure. The State Governments may also consider providing financial support matching the Central subsidy. For economic viability of such common facilities, the quantum of waste to be disposed of is undoubtedly the single most important factor. Considering the urgency to set up common facilities and also the imperative to make them viable, scientific planning backed by sound economic rationale is called for.

Transportation could account for a significant portion of disposal cost in the case of landfillable wastes. Location of TSDFs should therefore be close to the sources of generation. In view of the difficulties encountered in identifying suitable sites, setting-up of TSDFs should be considered within the industrial estates.

The capacity of an integrated waste management facility should be decided based on availability of hazardous waste in the State/in nearby area. Such a facility should comprise a secured landfill, arrangements for treatment, incinerator, a laboratory capable of comprehensive analysis, and arrangement for transportation and handling of wastes including supporting infrastructure. Such a facility could also have arrangement for recovery/recycle/reprocessing.

During operation and for a stipulated period of post closure, liability for any damage caused shall rest with the TSDF operator. A separate Escrow fund should be created by the facility operator for post-closure monitoring and a liability insurance be taken to deal with liability arising due to mishaps, calamities etc.

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The TSDFs should cater to meticulously delineated hazardous waste catchment areas taking into consideration their distance from the generators and availability of wastes based on the principle of hazardous waste disposal as close to the hazardous waste generation. The State Pollution Control Boards/Pollution Control Committees should ensure that in a given hazardous waste catchment area, there are no multiple operating TSDFs.

## **9. Interstate transportation of hazardous waste**

Interstate movement of hazardous wastes will be required when (a) landfillable waste generated by a State is less than 10,000 tonnes per annum (TPA), (b) a company with units located in several States proposes to incinerate wastes at one facility, and (c) incinerable waste generation in a State is less than 5000 tonnes per annum at which level an incineration facility becomes financially viable. Based on mutual consultations and agreement between the State Governments, interstate movement of hazardous wastes should be permitted, in particular, to take care of the difficulties faced by some States for development of TSDFs. Subject to the above, facilities for landfilling / incineration should be set-up within two years.



In any case, there should be no restriction on interstate transportation of recyclable/reusable of hazardous waste.

In case of some States/UTs, particularly the north-eastern States, combined facilities with neighboring States involving interstate movement appears to be a preferable option due to factors such as land availability and the amount of waste generated in each State for landfilling/incineration.

For proper tracking of HW disposal in an environmentally sound manner by the State Pollution Control Boards (SPCBs)/ Pollution Control Committees (PCCs) the Manifest System of movement of hazardous waste shall be followed as per the hazardous waste regulations.

The SPCB/PCC should develop on-line tracking system for movement of hazardous waste from generation to the disposal/recovery/recycle stage.

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## **10. Use of cement kilns for Hazardous Waste Incineration**

Subject to implementation of suitable safeguards, incineration of high calorific value hazardous wastes in cement kilns is one of the safe alternatives to conventional incineration. The spread of cement industry in the country across the States makes this option particularly attractive.

Sludge from petrochemical industry, oil refinery and paint industry as well as spent solvents/solvent recovery residues from pesticide and Bulk drug industries are particularly suitable for this purpose in view of their high calorific value. In the cement kilns, the high flame temperature of around 2,000 °C, high material temperature of around 1,400 °C and

large residence time of around 4-5 seconds ensure complete combustion of all organic compounds. Acid gases formed during combustion are neutralized by the alkaline raw material. The non-combustible residue including heavy metals gets trapped / embedded into the clinker in an irreversible manner. However, it may become necessary to carry out some blending and processing of the wastes before they are suitable for use in the cement kiln.

The Central Pollution Control Board has conducted field trials for different waste categories and also arranged to carry out monitoring of all hazardous air pollutants. As the field trials have indicated, compliance of notified emission norms for hazardous waste incinerators, use of hazardous wastes (such as ETP Sludge from dyes & dye intermediates, Tyre Chips, paint sludge, TDI Tar Residue and Refinery Sludge ) as supplementary fuels in Cement Kilns need to be promoted. In view of this, the respective State Boards may issue authorizations and necessary approvals. Use of incinerable waste for energy recovery in other industries may also be explored by CPCB.

In case of paint sludge, successful use after reconditioning as a primer / coating has been in practice in some of the automobile manufacturing industries. Such reuse of hazardous waste is a preferable option over co-incineration and should be encouraged.

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## **11. Illegal dump sites and remediation**

In the absence of common facilities, illegal and clandestine dumping of hazardous waste is reported in several States. Even after waste disposal facilities have become operational in some States, the problem persists. Surveillance, both by enforcement agencies and the industry associations, needs to be stepped up to avoid illegal dumping.

Remediation / rehabilitation of dumpsites should be based on scientific assessment of contamination of soil and groundwater, and based on modeling the projected future damage. The approach for site remediation, would vary modeling of from site to site depending on the nature of pollutants, future damage potential, remediation cost etc. The remediation strategy would include excavation of waste at site and shifting it to the nearest TSDF or establishing a dedicated secured landfill. Site remediation measures may be taken up to prevent further

spread of contamination through containment measures. In any case, the 'polluter pays principle' has to be strictly enforced which means that the polluter has to reinstate or restore the damaged or destroyed elements of the environment at his cost. To take care of cases of remediation where the polluters are not traceable, a dedicated fund should be created by the SPCB/PCC.

## **12. Strengthening of Infrastructure of Regulatory Bodies**

The mantle of hazardous waste management regulation is primarily on the State Pollution Control Boards at the field level. For effective discharge of their responsibility, the Boards have to be strengthened in terms of manpower, equipment, instruments and other infrastructure facilities. The Central and State Governments may support the Boards by adequate funding for effective implementation of the HW ( M, H & TM) Rules, 2008. Further, training and awareness programmes for the Boards staff need to be organized periodically.

The Customs Department plays an important role in regulating import of hazardous wastes into the country. Cases of illegal imports of hazardous wastes indicate the need to plug existing loopholes. Priority areas for action include harmonization of EXIM Regulations with the provisions of HW (Management, Handling & Transboundary Movement ) Rules, training of Customs Department Personnel engaged in inspection and sampling and also up-gradation of Customs Department laboratories.

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Appraisers carrying out inspection of hazardous waste received need to be trained to pick up representative samples. In addition to sampling techniques, appraisers should be made aware of current hazardous wastes regulations, documentation requirements, etc. Equally important is the need to upgrade laboratory facilities at all major ports of entry. Difficulties faced by Customs authorities in distinguishing between used oil and waste oil serves as a case in point to identify the gaps. Lack of laboratory facilities for analysis of trace organics, such as PCBs, could either result in holding up of supplies for long periods of time merely on grounds of suspicion or lead to illegal imports of waste oil under the garb of furnace oil/fuel oil. Trained man-power and equipment for analysis of all important heavy metals and trace organics

should be taken up and a time-bound plan prepared for their up gradation. Till such time all the ports are upgraded both in terms of equipment and training of laboratory personnel, outsourcing of laboratory related work to laboratories recognized under the Environment (Protection) Act may be considered.

There should be synchronization of the EXIM Regulation on waste characterization/classification with the Hazardous Wastes (M, H and TM) Rules and amendments thereof. Harmonization of Customs codes with the international system as amended from time to time should also be accorded high priority.

### **13. Disposal of date-expired drugs and pesticides**

There are significant quantities of date –expired drugs and pesticides lying in various States, which need to be disposed of. The options available are (i) to have these reprocessed wherever possible by the industry which supplied them (ii) to appropriately incinerate them either through dedicated incinerators of individual industries or through incinerators available with common facilities (TSDF). In order to deal with such hazardous wastes, interstate transportation as well as its disposal in a facility as per above-stated options should be permitted by the concerned State Governments.

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### **14. Handling and management of hazardous waste during ship dismantling**

Various materials/wastes containing hazardous constituents are handled during ship dismantling. These include used oil, waste oil, asbestos containing panels/tiles, damaged asbestos containing material, paint chips and unused chemicals like acids etc. Some of these materials can be used directly such as asbestos panels, unused chemicals etc., some can be sold to recyclers and others need to be disposed of in TSDFs. Adequate safety systems and procedures need to be adopted during dismantling and handling of these materials/wastes. This activity is required to be regulated through State Maritime Boards, SPCBs and Factory Inspectorates, as per the comprehensive code of the Ministry of Steel.

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