

ENVIS News Letter Hazardous Waste Management



Uttarakhand Environment Protection and
Pollution Control Board

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***Message from Chairman,
Uttarakhand Environment Protection
and Pollution Control Board***

The Hazardous Waste management is to identify hazardous waste generating industries, quantification of hazardous waste generated, present hazardous waste management practices adopted by various industrial sectors.

Union Ministry of Environment & Forests, Govt. of India has notified the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 According to the rules, the hazardous wastes are defined as:

1. Waste substances which are generated in the process indicated in column 2 of schedule 1, and consist of wholly or partly of the waste substances referred to in column 3 of the same schedule.
2. Waste substances which consist wholly or partly of substances indicated in schedule 2, unless the concentration of substances is less than the limit indicated in same schedule and
3. Waste substances indicated in part 'A' of schedule 3 applicable only to the import and export of hazardous wastes unless they do not possess any of the hazard characteristics as indicated in part 'B' of the same schedule.

In the light of above Rules, UEPPCB is in continuous process of updating the hazardous waste generating industries.

According to the Hazardous Waste Management Rules, the wastes are classified based on the process and hazardous waste streams, waste substances with concentration limits and waste characteristics. In this news letter an attempt has been made to present the present scenario of hazardous waste generating industries in the State. Also waste quantification and disposal methods are presented.

With this news letter it is an appeal to every hazardous waste generating unit to self access their process based on schedule-I and Schedule-II of the Hazardous Waste Management Rules 2008 and apply in form-I to this Board for effective hazardous waste management in the State.

Waste is hazardous when it has properties that might make it harmful to human health or the environment. The term 'hazardous' does not always mean that such waste is immediately harmful, though some can be.

1. **Hazardous Waste:**
International Perspective

General

Hazardous wastes pose a greater risk to the environment and human health and thus require a stricter control regime. European Commission has made directives for management of hazardous waste in Directive 91/689/EEC, as amended by Directive 94/31/EC. It provides additional record keeping, monitoring and control obligations from the "cradle to the grave", the waste producer to the final disposal or recovery. In addition higher attention is required when different categories of hazardous wastes are mixed with each other or with non hazardous wastes in order to minimize risk for the environment and human health. A consolidated definition of hazardous waste is hazardous **waste** is waste that poses substantial or potential threats to public health or the environment and generally exhibits one or more of these characteristics:

- carcinogenic
- ignitable (i.e., flammable)
- oxidant
- corrosive
- toxic
- radioactive
- explosive

The properties which render waste hazardous are laid down in the

Directive 91/689/EEC and are further specified by the Waste List Decision 2000/532/EC as last amended by Decision 2001/573/EC.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), was enacted in 1980. The primary contribution of CERCLA was to create a "Superfund" and provided for the clean-up and remediation of closed and abandoned hazardous waste sites. Before this act was created, hazardous wastes were being disposed in regular landfills until scientists measured unfavorable amounts of hazardous materials seeping into the ground. These chemicals eventually made their way to the water systems, and contaminated the soil that animals and crops used, as well as the soil that people employed to build their communities. After these regulations were put into practice, many landfills require now countermeasures against groundwater contamination; for example installing a barrier along the foundation of the landfill to contain the hazardous substances that may remain in the disposed waste. Currently, in order to enter a landfill, hazardous wastes must be stabilized and solidified, thus the new waste produced is less harmful than the original.

Resource Conservation and Recovery Act (RCRA)

In regulatory terms, according to RCRA of United State National Environment Protection Agency (USEPA) hazardous waste is a waste that either a "characteristic waste" or a "listed waste":

- **Characteristic Waste** - exhibits at least one of the four "characteristics" of hazardous waste (ignitability, corrosivity, reactivity, or toxicity)
- **Listed Waste** - appears on one of the four hazardous wastes lists (F-list, K-list, P-list, or U-list), or

Individual states may regulate particular wastes more stringently than mandated by federal regulation. This is because the U.S. EPA is authorized to delegate primary rulemaking authorization to individual states. Most states take advantage of this authority, implementing their own hazardous waste programs that are at least as stringent as the federal program.

Characteristic wastes

Characteristic Hazardous Wastes are defined as wastes that exhibit the following characteristics: ignitability, corrosivity, reactivity, or toxicity.

Ignitability

Ignitable wastes can create fires under certain conditions, are spontaneously combustible, or have a flash point less than 60 °C (140

°F). Examples include waste oils and used solvents. Test methods that may be used to determine ignitability include the Pensky-Martens Closed-Cup Method, the Seta flash Closed-Cup Method.

Corrosive

Corrosive wastes are acids or bases (pH less than or equal to 2, or greater than or equal to 12.5) that are capable of corroding metal containers, such as storage tanks, drums, and barrels. Battery acid is an example. The test method that may be used to determine corrosivity is the Corrosivity towards Steel.

Reactivity

Reactive wastes are unstable under "normal" conditions. They can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or mixed with water. Examples include lithium-sulfur batteries and explosives. There are currently no test methods available.

Toxicity

Toxic wastes are harmful or fatal when ingested, absorbed or inhaled (e.g., containing mercury, lead, etc.). When toxic wastes are land disposed, contaminated liquid may leach from the waste and pollute ground water. Toxicity is defined through a laboratory procedure called the Toxicity Characteristic Leaching Procedure (TCLP). The TCLP helps identify wastes likely to leach concentrations of contaminants that may be harmful to human health or the environment.

Listed Wastes:

Listed hazardous wastes are generated by specific industries and processes and are automatically considered hazardous, based solely on the process that generates them and irrespective of whether a test of the waste shows any of the "characteristics" of hazardous waste. Wastes that EPA has determined are hazardous. The lists include the F-list (wastes from common manufacturing and industrial processes), K-list (wastes from specific industries), and P- and U-lists (wastes from commercial chemical products).

Hazardous wastes are incorporated into lists published by the Environmental Protection Agency. These lists are organized into three categories:

The F-list (non-specific source wastes)

This list identifies wastes from common manufacturing and industrial processes, such as solvents that have been used in cleaning or degreasing operations. Because the processes producing these wastes can occur in different sectors of industry, the F-listed wastes are known as wastes from non-specific sources.

The K-list (source-specific wastes)

This list includes certain wastes from specific industries, such as petroleum refining or pesticide manufacturing. Certain sludge and

wastewaters from treatment and production processes in these industries are examples of source-specific wastes.

Discarded wastes (P-List and U-List)

P-List and U-List wastes are actually sub-lists of the same major list applying to discarded wastes. These wastes apply to commercial chemical products that are considered hazardous when discarded and are regulated under the following U.S. Federal Regulation: 40 C.F.R. 261.33(e) and 261.33(f). P-List wastes are wastes that are considered "acutely hazardous" when discarded and are subject to more stringent regulation. Nitric oxide is an example of a P-list waste and carries the number P076. U-Listed wastes are considered "hazardous" when discarded and are regulated in a somewhat less stringent manner than P-Listed wastes.

2 HAZARDOUS WASTE: NATIONAL PRESPECTIVE

Government of India had notified Hazardous Waste (Management & Handling) Rules 1989 as amended in 2003. These rules were suppressed with notified Hazardous Waste (Management, Handling and Transboundary Movement) Rules 2008. Main provisions of these rules are:

Every occupier of the Hazardous waste is required to get authorization from respective State

Pollution Control Board for collection, storage, transport, handling and disposal of the hazardous waste.

Categorization of Hazardous Waste

- i) **Recyclable:** The waste which has potential for recycling such as used oil, metals, etc. for recycling any hazardous waste occupier has to obtain registration from central pollution Control Board.
- ii) **Incinerable:** Incinerable waste is that waste which has much calorific value so that it can be burnt at high temperature in the incinerator. This includes paint sludge.
- iii) **Disposable:** Those wastes having neither potential for incineration nor recycling are to be disposed in to secured landfill site. Secured Land fill site along with incinerator where waste collection segregation, storage is taking place is called as Treatment Storage and Disposal Facility (TSD) and for setting up TSD prior Environment Clearance from Government of India is must.

Also, if the waste is being transported from one state to another for final disposal, occupier has to obtain No Objection Certificate from both the State Pollution Control Boards where from the waste is lifted and where the waste is transported for final disposal. It is the responsibility of transporter to intimate the respective State Pollution Control Boards in

which states the waste containing vehicle is passing through before arriving to its final destination.

In case the hazardous waste is transported for out side the Country than the permission from Central Government is to be obtained.

Waste storage limit is also prescribed in the rules. As per rules, hazardous waste can not be stored for more than 90 days. It means occupier has to dispose all of its hazardous waste within 90 days through registered recyclers or send it for incineration or at TSD. Government of India has also give relaxation for small generators of hazardous waste. It says storage limit of 90 days can be relaxed by the State Board if the waste quantity is less than 10 KL/10 MT per annum.

Duties of Occupier

1. Identify the hazardous waste as per schedule-I and Schedule-II of Hazardous Waste (Management, Handling and Transboundary Movement) Rules 2008.
2. Apply in form-I of the said Rules to Member Secretary, State Pollution Control Board for getting authorization for collection reception, treatment, storage and disposal of hazardous waste. Renewal of the authorization application should be filed before expiry of the previous authorization.

3. Make arrangements for safe temporary storage of hazardous waste.
4. Regular submission of dully filled Form-3 of the said rules. This form pertains to information in the prescribed format whenever the waste is being handled.
5. Annual submission of Form-4. This form means annual quantity and nature of hazardous waste and its disposal etc.
6. Copy of Form-13 is to be submitted whenever the waste is transported for recycling/incineration or for final disposal.
7. Occupier has to ensure that the waste is to be handed over such parties registered with Central Pollution Control Board, having approval for use of hazardous waste from Central Pollution Control Board and such parties should also be authorized by the State Pollution Control Board.
8. Registration for recycling and reprocessing of waste is to be obtained from Central Pollution Control Board under rule 8 of the said Rules.
9. If any industry intends to utilize hazardous waste for other beneficiary purpose, approval for such technology is to be obtained by Central Pollution Control Board under rule 11 of the said rules.

Orders of Hon'ble Supreme Court for Hazardous Waste Management

Hon'ble Supreme Curt has passed order in Writ petition 657/1995 dated October 14, 2003 for strict compliance of Hazardous waste Management Rules. Salient Features are as follows:

Pertaining to Occupier

1. It is responsibility of occupier to ensure full compliance of hazardous Waste Management Rules as applicable from time to time.
2. Every hazardous waste generating unit must has to display the information regarding air and water pollutants, hazardous waste and its storage etc on 4x6 feet Board Out side the factory gate within premises.
3. Hazardous waste storage is should be separate and clearly demarcated.
4. Workers handling hazardous waste should be properly trained w.r.t. handling of waste.
5. Transportation of hazardous waste should be in accordance with the provisions of Motor Vehicle Act.
6. Every unit must have to go through a third party audit report with involvement of local community for their hazardous waste management practices and compliance of the rules.

Pertaining to State Pollution Control Board

1. State Pollution Control Board has to prepare inventory of hazardous waste generating units in their State.
2. State Board has also to identify the illegal dumping sites of hazardous waste.
3. Every State Board has to develop at least one Common Treatment Storage and Disposal Facility (TSDF) in their State.
4. State Pollution control Board has to close down such units which are operating without authorization from the Board and in operation with violation of the conditions of the Authorizations.
5. State Board must has to ensure that previously stored hazardous waste be removed before renewal of the authorization to a unit.
6. Regular submission of Action Taken report on orders of Hon'ble Supreme Court to Ministry of Environment and Forests.

3 HAZARDOUS WASTE: STATE PRESPECTIVE

Uttarakhand State is divided into 13 Districts. During rapid industrialization, quantum of generation of hazardous waste is increases during last few years. At present there are 172 Hazardous waste generating units in the State. Status is given in Table:1. As per date there are 3256.7 MT disposable wastes, 9792.50 MT recyclable wastes and 3112.7 MT incinerable wastes is generated per year in the State. Graphical representation of

this waste on category basis and on region basis is given in figure 1 & 2 respectively. Apart from above waste, there are also empty containers which are covered in the rules and these are quantified as nearly 133000 per annum. Details of hazardous waste generating units and inventory based on waste category as per Schedule-I and Schedule-II is given in Annexure-I of this report.

Waste Disposal Practices in the State

At present there is not any functional Common TSDF in the State. Ministry of Environment and Forests has accorded Environment Clearance to M/s Bharat Oil and Company Ltd to setup Common TSDF and E-waste Management Facility at Roorkee Dist Haridwar. This Board has also issued Consent to Establish under Air and Water Act. This facility is expected to be commissioned by the end of March 2010.

Board has issued NOC/authorization to following parties for lifting waste from this State and transported it to treatment facilities in nearby States. Details are given below:

1. M/s Bharat Oil Company, Ghaziabad, UP
2. M/s Continental Petroleum Ltd, Jaipur
3. M/s Grishma Metal Technology, Mumbai
4. M/s Hindustan Platinum Pvt Ltd, Mumbai
5. M/s Mahrastra Scrap Dealers, Haridwar

As per international perspectives following are the Final disposal practices of hazardous waste

Hazardous wastes may undergo different treatments in order to stabilize and disposal.

Recycling

Many Hazardous wastes can be recycled into new products. Examples might include lead-acid batteries or electronic circuit boards where the heavy metals can be recovered and used in new products. Another example is the ash generated by coal-fired power plants; these plants produced two types of these residues: fly and bottom ash. Fly ash particles have a low density, are very fine, and are removed by air pollution control devices. On the other side, bottom ash is a dense, dark, gravelly substance that remains on the bottom of combustion chambers. After these types of ashes go through the proper treatment, they could bind to other pollutants and convert them into easier-to-dispose solids, or they could be used as pavement filling. Such treatments reduce the level of threat of harmful chemicals, like fly and bottom ash, while also recycling the safe product and helping the environment.

Portland cement

Another commonly used treatment is cemented based solidification and stabilization. Cement is used because it can treat a range of hazardous wastes by improving physical characteristics

and decreasing the toxicity and transmission of contaminants. The cement produced is categorized into 5 different divisions, depending on its strength and components. This process of converting sludge into cement might include the addition of pH adjustment agents, phosphates, or sulfur reagents to reduce the settling or curing time, increase the compressive strength, or reduce the leach ability of contaminants.

Neutralization

Some HW can be processed so that the hazardous component of the waste is eliminated, making it a non-hazardous waste. An example of this might include a corrosive acid that is neutralized with a basic substance so that it is no longer corrosive. (see acid-base reactions.) Another means to neutralize some of the waste is pH adjustment. pH is an important factor on the leaching activity of the hazardous waste. By adjusting the pH of some toxic materials, we are reducing the leaching ability of the waste.

Incineration, destruction and waste-to-energy

A HW may be "destroyed" for example by incinerating it at a high temperature. Flammable wastes can sometimes be burned as energy sources. For example many cement kilns burn HWs like used oils or solvents. Today incineration treatments not only reduce the amount of hazardous waste. They also generate energy throughout the gases released in the process. It is

known that this particular waste treatment releases toxic gases produced by the combustion of byproduct or other materials and this can affect the environment. However, current technology has developed more efficient incinerator units that control these emissions to a point that this treatment is considered a more beneficial option. There are different types of incinerators and they vary depending on the characteristics of the waste. Starved air incineration is another method used to treat hazardous wastes. Just like in common incineration, burning occurs, however controlling the amount of oxygen allowed proves to be significant to reduce the amount of harmful by products produced. Starved Air Incineration is an improvement of the traditional incinerators in terms of air pollution. Using this technology it is possible to control the combustion rate of the waste and therefore reduce the air pollutants produce in the process.

Hazardous waste landfill (sequestering, isolation, etc.)

A HW may be sequestered in a HW landfill or permanent disposal facility. "In terms of hazardous waste, a landfill is defined as a disposal facility or part of a facility where hazardous waste is placed in or on land and which is not a pile, a land treatment facility, a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground mine, a cave, or a corrective action management unit (40 CFR 260.10).

Pyrolysis

Some hazardous waste types may be eliminated using pyrolysis in an ultra high temperature electrical arc, in inert conditions to avoid combustion. This treatment method may be preferable to high temperature incineration in some circumstances such as in the destruction of concentrated organic waste types, including PCBs, pesticides and other persistent organic pollutants.



Figure:1 Quantum of different type of Hazardous waste in the Uttarakhand

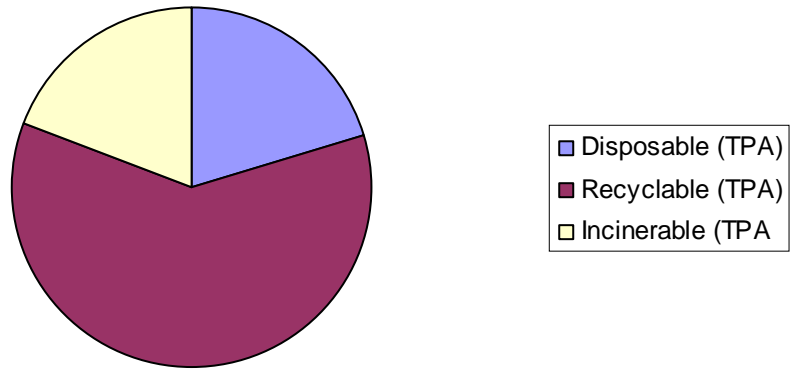
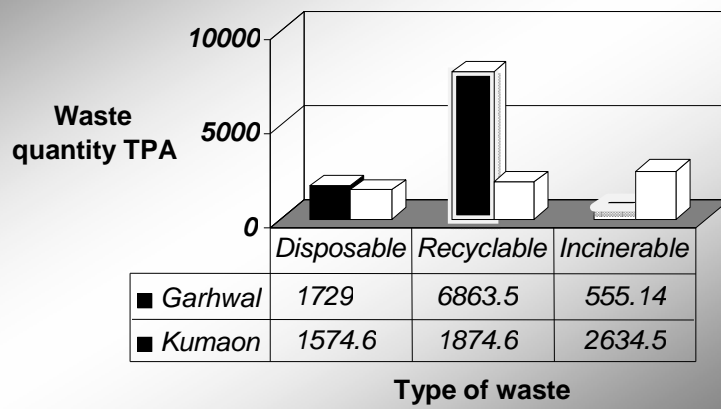


Fig:2 Graph showing the waste generation in two regions of Uttarakhand



Sources:

1. www.centuryrefineries.com/images/refining+process.jpg
2. www.doubleimage.co.uk/simpsons/1101.gif
3. www.earth1st.ca/images/Haz-+-Liquid-WM-poster.jpg
4. www.ec.europa.eu/environment
5. www.envfor.nic.in
6. www.epa.gov/waste/law-regs
7. www.lifetcy06.cevreorman.gov.tr/./agac_en.gif

Wanda wonders about Hazardous and Liquid Waste Management.



Environmental Messenger

Hazardous + Liquid Waste Management

WHEN YOU USE SOMETHING HAZARDOUS - YOU COULD END UP WITH A HAZARDOUS WASTE? SO ONLY BUY WHAT YOU NEED, AND USE IT ALL!

THE BEST WAY TO MANAGE HAZARDOUS WASTE IS NOT TO CREATE IT IN THE FIRST PLACE.

That means looking at the ways you do things. Try using earth friendly products!

If you have to use a hazardous material only buy what you need and use it all up for its intended purpose.

If you generate hazardous or liquid waste:

- handle it with care
- store it in a designated storage area
- make sure the container is labeled and in good condition
- store wastes in chemically compatible groupings
- ensure the waste is contained to prevent discharge into the environment
- have a spill kit close by
- do not mix hazardous wastes, they could react
- never pour hazardous or liquid waste down a drain

Hazardous and Liquid Wastes are not acceptable in your regular garbage container.

Hazardous and Liquid Wastes from your workplace, home or school need special handling.



At work:

- register as a hazardous and liquid industrial waste generator
- use an approved waste hauler to transport your waste
- know where your waste is going
- get a copy of Approvals from the Waste Disposal Site and Waste Transporter

Can your waste be recycled?

If so is it being recycled?

When shipping the waste, use a manifest.

A manifest is a government document which tracks the waste from the generator to the site that recycles, treats or disposes of the waste. Keep copies of the manifest for at least 2 years.

At home:

- collect your household hazardous wastes and take them to special depots
- contact your municipality to find out where and when.



Questions

What liquid and hazardous waste do you create?

How could you redesign your operations so that this waste is not created?

Where is/are your designated storage area(s) for liquid and hazardous waste?

How is your liquid and hazardous waste managed when it is shipped from your site?



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