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RE-USE OF HAZARDOUS WASTE IN CIVIL ENGINEERING

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ABSTRACT

Disasters occur due to both the natural and man-made activities. Hazards and Disasters are categorized into four groups, viz., Natural events, Technological events, Man-made events and Region-wise events. The adverse impacts caused due to the indiscriminate disposal of Hazardous Wastes (HWs) come under the category of Environmental Disasters. Hazardous Waste Management (HWM) is a very important issue and is assuming significance globally. Very few industries in India, mostly in large scale and a few in medium scale, own proper treatment and disposal facilities. A common waste treatment and disposal facility such as Treatment, Storage and Disposal Facility (TSDF) for management of HWs generated from industries, is one of the useful options under such conditions. Few Guidelines issued by Ministry of Environment and Forests under Hazardous Wastes (Management & Handling) Rules, 1989 promulgated under Environment (Protection) Act, 1986 are available in India for selection of best site for TSDF. The planning for HWM comprises of several aspects ranging from identification and quantification of HW to development and monitoring of TSDF.

This report work aims at studying various methods used in managing hazardous wastes which can be effectively applied in developing countries like INDIA.

I. INTRODUCTION

A hazardous waste is any waste or combination of wastes that poses a substantial danger, now or in the future, to human, plant or animal life and which therefore cannot be handled or disposed of without special precautions. The Hazards and Disasters can be classified into four categories viz., Natural events, Technological events, Man-made events and Region-wise events. The adverse impacts caused due to the indiscriminate disposal of Hazardous Wastes (HWs) come under the category of Environmental Disasters.

For example, in 1982, 2242 residents are evacuated after dioxin is found in soil in Missouri, U.S.A. In 1996-97, 265354 tonnes of soil and other dioxin-contaminated material from Times Beach (Missouri, U.S.A) and 26 other sites in eastern Missouri had been incinerated. Release of Methyl Isocyanate (MIC) gas in Bhopal (1984) caused a severe disaster in India. So there is a growing concern all over the world for the safe disposal of hazardous waste generated from anthropogenic sources.

II. CLASSIFICATION OF HAZARDOUS WASTE

US EPA has designated five categories considered as hazardous:

1. Specific type of wastes from nonspecific sources:

a. halogenated &non-halogenated solvents

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b. electro-plating sludges

c. cyanide solutions from plating batches

2. Specific types of wastes from specific sources;

a. oven residue from production of chrome oxide green segments

b. brine purification muds from the mercury cell process in chlorine production

3. Specific substances identified as acute hazardous waste:

a. potassium silver cyanide,

b. toxaphene

c. arsenic oxide.

4. Specific substances identified as hazardous wastes e.g. Xylene, DDT, carbon tetrachloride

5. Characteristic wastes:

Wastes not specifically identified elsewhere exhibiting properties of: ignitability, corrosivity, reactivity, or toxicity

III. BASIC APPROACH IN HAZRDOUS WASTE MANAGEMENT

OBJECTIVES

A logical priority in managing hazardous waste would be to:

1. Reduce the amount of hazardous wastes generated in the first place.

2. Stimulate "waste exchange":

- One factory's hazardous wastes can become another's feedstock; e.g. acid and solvent wastes from some industries can be utilized by others without processing.

3. Recycle metals, the energy content, and other useful resources contained in hazardous wastes.

4. Detoxify and neutralize liquid hazardous waste streams by chemical and biological treatment.

5. Destroy combustible hazardous wastes in special high-temperature incinerators equipped with proper pollution control and monitoring systems.

6. Dispose of remaining treated residues in specially designed landfills.

7. Treatment, storage, disposal facility(TSDF) requirements-

- Treatment: Any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize it or render it nonhazardous or less hazardous; to recover it; make it safer to transport, store, or dispose of; or make it amenable for recovery, storage, or volume reduction.
- Storage: The holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed, or stored elsewhere.
- Disposal: The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

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IV.TREATMENT OF HAZARDOUS WASTE

Treatment when used in connection with an operation involved in hazardous waste management, means any method, technique, or process, including neutralization or incineration, designed to change the physical, chemical, or biological character or composition of a hazardous waste, so as to neutralize such waste or to render such waste less hazardous, safer for transport, amenable for recovery or reuse, amenable for storage, or reduced in volume.

Wastes remain after the implementation of waste minimisation must be treated to detoxify and neutralise them. There are large number of treatment technologies available.

Examples:

- Biological oxidation
- Chemical precipitation, oxidation-reduction
- Ion exchange
- Carbon adsorption
- Membrane separation
- Other/new technologies

V. DISPOSAL OF HAZARDOUS WASTE

Disposal is the placement of waste into or on the land. Disposal facilities are usually designed to permanently contain the waste and prevent the release of harmful pollutants to the environment. The most common hazardous waste disposal practice is placement in a land disposal unit such as a landfill, surface impoundment, waste pile, land treatment unit, or injection well. Land disposal is subject to requirements under EPA's Land Disposal Restrictions Program.

Underground injection wells are the most commonly used disposal method for liquid hazardous waste. Because of their potential impact upon drinking water resources, injection wells are also regulated under the Safe Drinking Water Act (SDWA) and by the Underground Injection Control (UIC) Program.

VI. DEEP WELL INJECTION

Deep well injection is a liquid waste disposal technology. This alternative uses injection wells to place treated or untreated liquid waste into geologic formations that have no potential to allow migration of contaminants into potential potable water aquifers. A typical injection well consists of concentric pipes, which extend several thousand feet down from the surface level into highly saline, permeable injection zones that are confined vertically by impermeable strata. The outermost pipe or surface casing, extends below the base of any underground sources of drinking water (USDW) and is cemented back to the surface to prevent contamination of the USDW.

Directly inside the surface casing is a long string casing that extends to and sometimes into the injection zone. This casing is filled in with cement all the way back to the surface in order to seal off the injected waste from the formations above the injection zone back to the surface. The casing provides a seal between the wastes in the

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injection zone and the upper formations. The waste is injected through the injection tubing inside the long string casing either through perforations in the long string or in the open hole below the bottom of the long string. The space between the string casing and the injection tube, called the annulus.

VII. LAND FILL

The EPA defines a landfill as an engineering method of disposing of solid waste on land. As such, landfills are required to protect the environment by spreading waste into thin layers and compacting them into the smallest practical volume. By day's end, all waste is then covered with earth. Transfer stations have their own regulations. They are required to have their floors clear of all waste by the end of the working day.

VIII. CONCLUSION

The industry driven economy of India's has resulted in hazardous waste problems, which are difficult to manage in an environmentally friendly manner. The lack of awareness, improper implementation of principles and laws, absence of proper infrastructure and centralized disposal facilities, and lack of technical and financial resources have led to the unscientific disposal of hazardous wastes posing serious threat to human, animal and plant life. All studies related to this matter indicate that the hazardous wastes situation in India is fairly grim. Thus, there is an urgent need for formulating proper hazardous waste management strategies, implementation of hazardous wastes management regulations and establishment of proper hazardous waste treatment and disposal facilities for controlling the unscientific disposal of hazardous wastes .This is now being done in India, but needs more improvement with the aid of better technologies.

REFERENCE

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AND ENVIRONMENTAL ENGINEERING