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CONTROLLING ADVERSE EFFECT OF HAZARDOUS WASTE PRODUCED BY PAINT INDUSTRIES

Vinoth M[1],Muthukumar L[2],

[1] *Assistant Professor, Department of Mechanical Engineering, Knowledge Institute of Technology Kakaplayam, Salem,- 637504, Tamilnadu*

[2] *PG Scholar , Department of Mechanical Engineering, Knowledge Institute of Technology Kakaplayam, Salem,- 637504, Tamilnadu*

ABSTRACT

With the rapid advancement of science, technology, and the economy, the rapid accumulation of hazardous waste has become one of the most common environmental issues confronting the entire world. However, hazardous materials with toxic, corrosive, flammable, reactive, and infectious properties, as well as other dangerous properties, will cause serious harm to the environment, ecology, and human health if not handled properly. As a result, hazardous waste disposal research is extremely important in practice. This paper provides a basic overview of hazardous waste, as well as the current state of hazardous waste disposal in industries. Hazardous waste is defined as waste that poses significant or potential risks to public health or the environment. Hazardous wastes can exist in a variety of physical states, including gaseous, liquids, and solids. A hazardous waste is distinct from other types of waste because It cannot be disposed of in the same manner as other byproducts of our daily lives. Treatment and solidification processes may be required depending on the physical state of the waste. The final stage of a hazardous waste management system is hazardous waste disposal. In order to have secure disposal facilities, almost all possible disposal methods require proper pre-treatment. This article summarizes the fundamentals of various waste disposal methods, including incineration, immobilization, landfill, off-shore, and underground storage. The benefits, drawbacks, and applicability to developing countries are discussed.

Keywords: Landfill, Incineration, Reuse, Recycle, Co-Processing.

I. INTRODUCTION

Tamilnadu has emerged as one of the leading industrialised states in India, with the vision of becoming the largest business hub in Asia. The state's industrial policy has shifted from cluster and state-based industries to special economic zones (SEZs). Tamil Nadu has become the fastest growing state in terms of industrial development, with pharmaceutical, chemical, and drug manufacturing, as well as petrochemical, textile, pesticide, and fertilizer manufacturing. On the basis of the total quantity and characteristics of various types of waste generated and production in industries, Tamilnadu industries are classified as Red, Green, and Orange..

II. LITERATURE SURVEY

Krishnaswamy Kanagamani, P. Geethamani and M. Narmatha) have published a journal on “Hazardous Waste Management”. This paper investigates waste management as one of the most important environmental issues in recent decades. It has been observed that waste generation increases with increasing population, industrialization, and urbanization, among other factors. The waste management strategy addresses both non-hazardous and hazardous waste. Non-hazardous waste poses no potential threat to the environment, whereas hazardous waste poses significant or potential threats to public health and the environment. The rapidly expanding industrial sector has contributed to the generation of large amounts of hazardous waste. To reduce environmental hazards, proper care must be taken during the storage, segregation, transportation, and disposal of hazardous waste, as it cannot be disposed of as is in the environment

.V. Misra, S.D. Pandey, Hazardous waste, impact on health and environment for development of better waste management strategies in future in India. This paper investigates Industry has become an essential component of modern society, and waste generation is an unavoidable byproduct of development activities. When a material is discarded without expecting to be compensated for its inherent value, it becomes waste. When improperly treated, stored, transported, disposed of, or managed, these wastes may pose a risk to human health or the environment (soil, air, and water). Even though hazardous wastes, emissions, and effluents are currently regulated in India, solid wastes are frequently disposed of indiscriminately, posing health and environmental risks. As a result, management of hazardous wastes, including disposal in an environmentally friendly and economically viable manner, is critical, and suggestions for developing better strategies are made.

E.D.Enger, B.F.Smith, A study of interrelationships. Environmental Science. Edward E. Bartell. California, USA, 2004 This paper accomplishes Since the last few decades, waste management has been a critical environmental issue. It has been observed that waste generation increases with increasing population, industrialization, and urbanization, among other factors. The waste management strategy addresses both non-

hazardous and hazardous waste. Non-hazardous waste poses no potential threat to the environment, whereas hazardous waste poses significant or potential threats to public health and the environment. The rapidly expanding industrial sector has contributed to the generation of large amounts of hazardous waste. To reduce environmental hazards, proper care must be taken during the storage, segregation, transportation, and disposal of hazardous waste, as it cannot be disposed of as is in the environment. This study discusses hazardous wastes, their types, and management.

Malviya, Rachana; Chaudhary, Rubina (2006). "Factors affecting hazardous waste solidification. Solidification/stabilization is accepted as a well-established disposal technique for hazardous waste. As a result, various binders are used to treat a wide range of hazardous wastes. The properties of S/S products differ from those of waste and binders separately. Physical, chemical, and microstructural methods are used to investigate the effectiveness of the S/S process. Asphyxiation, falls, and crushing injuries are all possibilities. There are currently a small number of welders with physical morbidity. Publications about apprentice welding are required for knowledge improvement and to provide welders with health promotion education.

Ferronato N, Torretta V. 2019 "Waste Mismanagement in Developing countries" This paper investigates Environmental contamination caused by improper solid waste management is a worldwide problem. The main waste treatment and final disposal systems used in low-income countries are open dumping and open burning. This paper examines the major consequences of waste mismanagement in developing countries, with a focus on environmental contamination and social issues. The informal sector's activity in developing cities was also examined, with a focus on the major health risks associated with waste scavenging. According to the findings, environmental impacts are widespread throughout the world, with the most serious issues being marine litter, air, soil, and water contamination, and waste pickers' direct interaction with hazardous waste.

Fazzo, L. & Minichilli, Fabrizio & Santoro, Michele & Ceccarini, A. & Seta, Maurella & Bianchi, Fabrizio & Comba, P. & Martuzzi, M.. (2017). A systematic review of the scientific literature on hazardous waste and its impact on health. 16. 10.1186/s12940-017-0311-8. Waste is on the agenda of the European Environment and Health Process, and it is one of the topics to be discussed at the Sixth Ministerial Conference on Environment and Health. Hazardous waste disposal and management are global issues. We used transparent and predefined methods to conduct a systematic review to assess the evidence of the health impact of hazardous waste exposure. The five steps listed below were implemented based on pre-defined systematic criteria. In terms of "Population-Exposure-Comparators-Outcomes" (PECO), define the research question. Population: people who live near hazardous waste sites; Exposure: people who have been exposed to hazardous waste; Comparators: all comparators; Outcomes: all diseases/health disorders.

Faupel, Charles & Bailey, Conner. (2023). Contingencies Affecting Emergency Preparedness for Hazardous Wastes. International Journal of Mass Emergencies & Disasters. 6. 131-154. 10.1177/028072708800600203. Through a case study of emergency preparedness activities at the largest hazardous waste landfill within the United States, which is located in Sumter County, Alabama, this article highlights three features which constrain such preparedness efforts: (1) the specialized nature of hazardous waste; (2) the politicization of the hazardous waste industry; and (3) jurisdictional dilemmas created by the merger of public and private roles in hazardous waste emergency preparedness. The article concludes with a discussion of policy implications for federal, state and local policymakers and implementers. occurring accidents such as falls, slips, and jammed injuries. An important means of reducing the frequency of occupational accidents in small- to medium-sized enterprises (SMSEs) of South Korea is to perform intensity analysis of the root cause factors for accident prevention in the cause-and-effect model like decision models, epidemiological models, system models, human factors models, LCU (life change unit) models, and the domino theory. Especially intensity analysis in a robot system and smart technology as Industry 4.0 is very important in order to minimize the occupational accidents and fatal accident because of the complexity of accident factors. They have developed the modern cause and effect model that includes factors of root cause through statistical testing to minimize commonly occurring accidents and fatal accidents in SMSEs of South Korea and systematically proposed educational policies for accident prevention. As a result, the consciousness factors among factors of root cause such as unconsciousness, disregard, ignorance, recklessness, and misjudgement had strong relationships with occupational accidents in South Korean.

Varshney, Ramita & Singh, Pratichi & Yadav, Deepak. (2022). Hazardous wastes treatment, storage, and disposal facilities. 10.1016/B978-0-12-824344-2.00009-4. Hazardous waste (HW) is defined as any residue or combination of residues that may be a potential hazard to humans or the environment. Wastes are classified as hazardous if they exhibit one or more properties of ignitability, corrosivity, reactivity, or toxicity. HW sources may be household, industrial, or biomedical. A waste is determined to be hazardous if it is specifically listed on one of four lists (the F, K, P, and U lists). Universal HWs are batteries, lamps, pesticides, mercury from thermometers, etc. Therefore, HW needs to be handled, stored, transported, treated, or disposed of carefully. A hazardous waste management strategy involves the following steps: (i) Waste minimization, (ii) detoxification and neutralization of waste by treatments, (iii) destruction of combustible waste by incineration, (iv) solidification of sludge and ash from steps 2 and 3, and (v) disposal of residues in landfills (waste minimization strategies include source reduction, recycling, and waste exchange).

III. Problem Identification

The biological, chemical, and physical properties of hazardous wastes are used to classify them. These properties produce toxic, reactive, ignitable, corrosive, infectious, or radioactive materials. Toxic wastes are poisonous even in minute or trace amounts. They may have acute effects, resulting in death or severe illness, or they may have chronic effects, causing irreparable harm over time. Some are carcinogenic, meaning they can cause cancer after many years of exposure. Others are mutagenic, causing significant biological changes in exposed humans and wildlife offspring. Chemically unstable reactive wastes react violently with air or water. They can cause explosions or toxic vapours. Ignitable wastes burn at relatively low temperatures, posing an immediate fire risk. Corrosive wastes contain highly acidic or alkaline substances.

Used bandages, hypodermic needles, and other materials from hospitals or biological research facilities are examples of infectious waste. Radioactive waste produces ionizing energy, which can be harmful to living organisms. Because some radioactive materials can persist in the environment for thousands of years before fully decaying, there is considerable concern about their disposal. However, local municipal governments are not responsible for the handling and disposal of radioactive materials. Because of the scope and complexity of the problem, radioactive waste management—particularly nuclear fission waste—is usually considered a separate engineering task from other types of hazardous-waste management, as discussed in the article nuclear reactor.

IV. Objective of the Project

The preliminary goal of the project work is to investigate the reasons why improper disposal of hazardous waste has such large environmental consequences. The amount of hazardous waste generated every day by business and industry has an impact on the health of the air, soil, water, and wildlife.

The presence of negative health effects is determined by how the hazardous chemical enters the body. Some dangerous chemicals absorb quickly through the skin, while others do not. The toxicity of a chemical influences its effect on the body. Many hazardous chemicals are toxic in very small amounts, whereas others require large amounts of exposure before causing a reaction. The average

person contains up to 300 man-made chemicals. The presence of hazardous chemicals in the human body causes adverse reactions in fetuses, children, adolescents, adults, and the elderly, but the severity of the reaction varies. Because their developing organs may be permanently damaged, a fetus and young child are more vulnerable to adverse reactions than an adult. Some potential health conditions in people of all ages include:

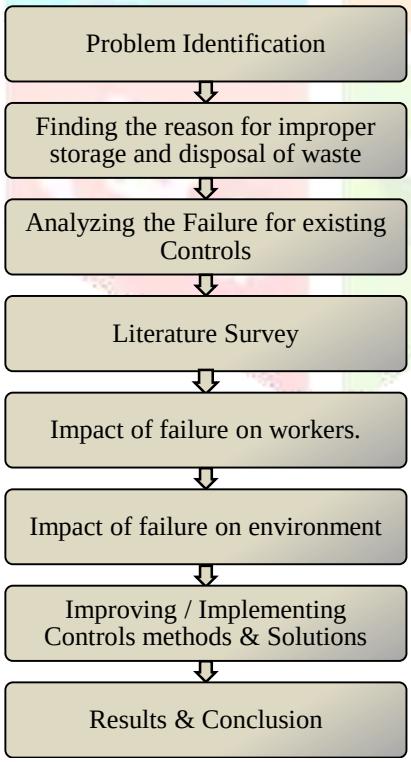
- Behavior Abnormalities.
- Cancer.
- Genetic Mutation.
- Physical deformations.
- Birth Defects.

V. SCOPE OF THE PROJECT

Phase I of the project work analyzes and identifies what hazardous waste is generated in paint industries and the impact of improper waste disposal. Work on the proper storage and disposal of hazardous waste is planned for phase II of the project. Initially, we decided to implement the hazardous waste management rules 2016 guidelines and allocate a separate location.

VI. METHODOLOGY

The methodology for the current work is as follows: the problem is identified through a physical visit and communication with the facility's workers. According to the problem identified, an investigation was conducted to determine the cause of improper hazardous waste storage. Then a study was conducted to determine how to store and dispose of hazardous waste, as well as how welding fumes affect workers, and various control measures were analyzed to determine the most appropriate control measure based on the control hierarchy. The control measure is scheduled to be implemented in that facility following the feasibility test.



VII. APPROACH

S.no	*Residue value*	*Description*
1	5.1	Spent oil
2	5.2	Oil chocked waste
3	20.2	Spent Solvents
4	33.1	Discarded Container
5	35.3	Chemical Sludge

7.1: Spent Oil

Keep containers and tanks in good condition. Don't allow tanks to rust, leak, or deteriorate. Fix structural defects immediately. Never store used oil in anything other than tanks and storage containers. Container must kept in above of the secondary containment kit with proper earthen provision and collection kit to be provide incase any leakage in container it should be collected in collection kit.

7.2: Oil Choked Cotton Waste

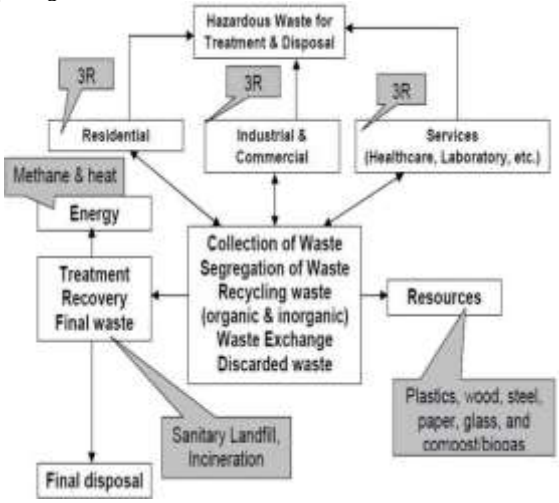
Oil Chocked cotton waste must kept in separate drum which is fully sealed and Oil choked waste storage location should be in locked condition and ensure the location must be free from water sourcing area to the industries

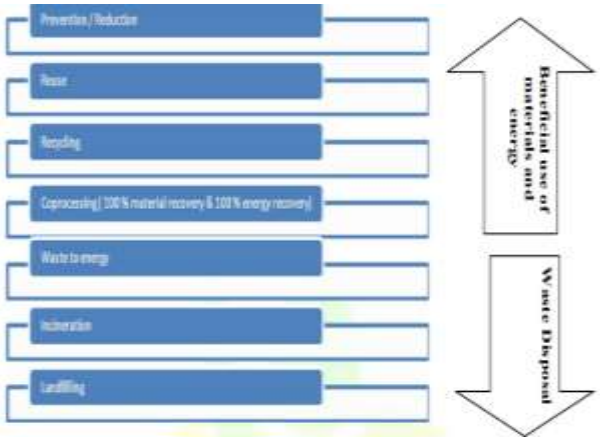
7.2: Spent Solvents

Spent Solvents should be stored in vented cabinet, clearly labelled metal cabinet ad/or lidded containers and/or trays. Keep solvent containers closed when you're not using them this will minimize emission to the atmosphere by evaporation. Avoid under ground storage tank for storing solvents. Storage tank should be clearly labelled for easy identification. Storage tank must to be provide proper earthen and secondary containment kit to be provide for avoid spillage, Placed chemical spill kit incase of any spillages we use spill kit for handle the situation depend on factors such as the ventilation system's design, maintenance, and adherence to occupational health and safety guidelines.

VIII. SAFE DISPOSAL OF HAZARDOUS WASTES

Here below is the process of HW Management once the HW is collected SPCB think as to what are the options available for them to handle them out as per this diagram its best to reduce the HW , reuse , recycle the HW using it as a resource for some other industrial or manufacturing processes, waste for that there are common treatment stabilization and disposal facility (TSDF) totally almost India has 27 TSDF, which does the disposal of HW. Also a new concept of Co processing which is the best method for HW treatment with zero residual is introduced, incineration is the process of destruction of all high calorific and highly toxic wastes by burning the waste at high temperature, Lastly landfill is disposing off.





IX. Recommendation of Safe Disposal of Hazardous Waste

S.no	***Category No***	***Disposal Method***
1	5.1-Used or spent oil	Generation, Collection, storage and sent to TNPCB approve Hazardous waste recyclers. (Recyclable)
2	5.2-Oil Chocked Cotton Waste	Generation, Collection, storage and sent to TNPCB approve Hazardous waste recyclers. (Recyclable)
3	20.2-Spent solvents	Generation, Collection, storage and sent to TNPCB approved Co-processing unit.
4	33.1-Empty barrels/containers	Generation, Collection, storage and sent to TNPCB approve Hazardous waste recyclers. (Recyclable)
5	35.3 Chemical Sludge	Collection, storage and sent to TNPCB approved Co-processing unit.

X. Hazardous Waste Storage Material

Fig 10.1 Used oil storage

Fig 10.2 Oil Choked waste Storage

Fig 10.3 Spent Solvents storage area

Fig 10.4 Discarded Container

XI. Conclusion

The main goal of the hazardous waste management program is to change the way hazardous waste is managed so that it can be stored, transported, and disposed of in an environmentally safe manner. The emphasis on hazardous waste management stems from an effort to address potential threats to public health and the environment. Hazardous waste management must include more than just dumping it on the ground. Industries are encouraged to produce less hazardous waste as part of the manufacturing process. Because toxic wastes cannot be completely eliminated, the only option is to reduce, recycle, and treat waste. As a result, steps should be taken to use modern technology without endangering the environment. Waste reduction, recycling, co-processing, and treatment.

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