

HAZARDOUS WASTE MANAGEMENT- SUCCESSFUL PRACTICES AT ASIAN PAINTS, HYDERABAD

Abstract

Regularisation of hazardous waste disposal through legal restrictions started only after major environmental disasters during 1960 -1970 in USA, UK and other industrialized countries. Starting from restricting the methods of improper disposal of hazardous wastes, the legislations have improved to mandate minimising waste generation at source. In India also, though the first law on hazardous waste disposal was enacted two decades after USA and UK, currently the legal requirements are quite stringent and comparable to the ones in developed countries. Asian Paints India Limited (APIL) understanding the need for improving the environment protection has made systems to comply with entire legal requirement and also go beyond compliance and ensure safe environment in areas where the manufacturing facilities are located. In the process of improving environmental performance, the company has found various ways of minimising the waste generation or even eliminating some waste streams. This paper briefly discusses about the legal requirements on hazardous waste management and practices followed at Asian Paints India Limited.

1. Introduction

1.1. Asian Paints India Limited

Asian Paints India Limited (APIL) was founded in 1942 in Mumbai and has over the years grown to become India's leading paint manufacturer. It has in its portfolio several different products and more than a thousand shades to choose from. Asian Paints was presented the 'Harvard Business School Association Award' in 1987 in the mini-giant category, and again in 1997 in the Giants category. According to KC Lubyen report, Asian Paints is the second most profitable paint company in the world. All the six manufacturing facilities in India are certified for ISO 9001 and ISO 14001 systems.

2. Hazardous Waste Management at Asian Paints

2.1. Storage, Treatment and Disposal Facilities

APIL has identified a total of 78 types of wastes from paint manufacturing facilities, out of which 18 are hazardous as per HW Amendment Rules, 2000. Apart from this, wastes that were considered as hazardous as per HWMH Rules, 1989, but not as per HW Amendment Rules, 2000 are also treated as hazardous waste.

There is a common format for all the plants that detail the disposal options for each of these wastes. Treatment processes though not uniform due to different legal requirements in different states, are standardized for each plant.

Hazardous wastes are stored in 'Scrap Yard' which has RCC platforms and compartments for storage of hazardous waste in specified locations. The detoxification equipment are also installed in scrap yard. The details of hazardous waste generation, detoxification and disposal are recorded in Form III format as given in HWMH Rules 1989. For hazardous containers there are three different zones, Red, Orange and Green Zones for storing uncleaned, cleaned but waiting for approval and detoxified and approved barrels respectively. The containers are detoxified with caustic solution or solvents depending on the contaminant in the containers. The wash water generated is treated in the Effluent Treatment Plant (ETP) and the solvent is recovered in Solvent

Recovery Plant (SRP) and reused for appropriate purpose. Hazardous waste containers from packing operations are crushed in hydraulic press, detoxified by incineration or caustic washing and then disposed to authorised scrap contractors.

Non-Reusable hazardous wastes are incinerated to reduce the volume of hazardous waste for minimising storage area requirement in secured landfills. The ash from incinerator is either disposed to the TSDF or stored in secured landfill or converted to bricks. TSDF facility is available for plants in Gujarat and Andhra Pradesh, but not for plants in Uttar Pradesh and Maharashtra. Before the establishment of TSDF's, the plants constructed their own double liner secured landfills with leachate collection and treatment of leachate and stored the hazardous wastes in them.

The company has also conducted studies for immobilisation of ETP sludge and Incinerator ash for making these wastes suitable for direct landfill. Immobilisation study for ETP sludge was first conducted by Anna University later continued in the environmental laboratories in different plant for ash. The plants have successfully come out with several formulations for making bricks out of incinerator ash that meet both environmental requirements in terms of 'Toxicity Characteristics Leachate Procedure' (TCLP) and 'Unconfined Compressive Strength' (UCS). Two of the plants are making bricks from ash and using them for construction purpose and the other two plants are sending it to the nearby TSDF.

2.2. Pollution Prevention, Waste Minimisation, Recycling and Reuse

APIL believes that pollution control does not solve problems, but alter the problems, shifting the pollutants from one form to another. The form or state of the pollutant may be changed during waste treatment; it does not disappear. It takes resources to remove pollution and pollution removal generates residue. It takes more resources to dispose of this residue and in the process create more pollution.

Given below is the approach to waste minimisation adopted by APIL. (Options are not given in order of preference)

- a. Recycling a potential waste or portion of it 'on site' where it is generated
- b. Improving process technology and equipment that alter the primary sources of waste generation
- c. Improving plant operations, such as house keeping, materials handling, equipment maintenance, automating process and packing equipment
- d. Redesigning or reformulating products
- e. Conducting waste audits and monitoring and tracking of waste generation

Following the above-mentioned approach, several waste minimisation projects were implemented in all the plants that reduced hazardous waste generation substantially. As a result, two of the manufacturing facilities, one located in Patancheru near Hyderabad and other one in Ankleshwar got permissions from respective SPCB's for enhancing the production capacity by approximately 60% on the basis of 'no increase in pollution load' with increase in production. Presented below is a selected list of projects implemented.

S.No	Project Name	Project Description	Environmental Benefits
1	Solvent Recovery Project	Waste solvents generated due to washings of reactors and equipment, solvent from vent condenser. waste solvent generated	Resource Conservation, Reduced hazardous waste generation. Elimination of hazardous barrels generation due to these RM's.

		during filtration operation are distilled and reused in washings and process. Residue is used as fuel in Incinerator.	Reduction in resource loss
2	Bulk Storage Facilities for Liquid Raw Materials	Liquid RM's will be received in returnable tankers stored in bulk storage facilities to eliminate barrels handling due to these materials. This facility is provided for all major liquid raw materials.	Elimination of hazardous barrels generation due to these RM's, Reduction in resource loss
3	AMC Wash Water Reuse	AMC wash water stream contains about 5-7% of pigments that can be used as colourants for different products. This project comprised provision of collection, transport, quality assurance, storage and distribution of this wash water	Reduced effluent generation reduced sludge generation in ETP and reduced disposal cost, Resource Conservation
4	Emulsion Wash Water Reuse	Another wash water stream containing emulsion that can be used in some products	Reduced effluent generation reduced sludge generation in ETP and reduced disposal cost
5	Fuel Conversion from Furnace Oil to Diesel	Conversion of heating systems to use Diesel that contains <0.25% of Sulphur from Furnace Oil that contains 3.25% Sulphur	Reduction in Sulphur dioxide emissions

3. Monitoring and Measurement

3.1. Quality Parameters

All the plants are provided with well-equipped laboratories to monitor the environmental quality of different wastes and performance of various pollution control systems. External agencies approved by SPCB's are also employed for monitoring quality of air emissions, treated effluent, ground water quality, soil characteristics and other parameters as required by MoEF and SPCB's.

3.2. Quantity of wastes

The wastes are segregated in the section and stored in colour coded bins or in labeled barrels. The concerned supervisor takes necessary permissions from section incharge in a standard format and moves it to the scrap yards. After verifying the contents and quantity, the material is allowed in the scrap yards and placed in the respective compartment / area. The details are entered in the register (Form III). The detoxification details, quantity disposed are also recorded in the same register. General Manager - Manufacturing monitors the quantity of wastes generated on monthly basis through a 'EHS Scorecard Report' sent by all the plants. Quantity of sludge and ash generated is captured in different reports sent to him. The hazardous waste materials when disposed to authorised contractors is transported with a manifest system that helps tracking the waste movement and ultimate disposal / reuse. Apart from submitting Form IV and 'Environmental Statement', the waste generation details are submitted to the SPCB's every month.

3.3. Cost of Waste

One of the plants has developed a system for capturing the cost of different wastes generated and monitors the same every month. This system tracks quantity of different groups of wastes generated from various locations in the plant and details of value of the wastes, value for which it was sold, disposal cost etc. Given below is the formula for calculating Cost of Waste (COW)

$$\text{COW} = (\text{cost of material} + \text{treatment cost} + \text{disposal cost} + \text{packaging cost}) - (\text{Value for which the waste was sold})$$

The results are sent to waste generators every month. Attaching a 'monetary loss tag' to waste generation has evolved good response among generators. This system is still under trial; after successful trials this will be implemented in other plants also.

The model is as given below:

Month: X

Waste Category	Section 1	Section 2	Section 3	Total
WC 1	S11	S12	S13	T1
WC 2	S21	S22	S23	T2
WC 3	S31	S32	S33	T3

Using the above data graphs are plotted to project

- 'COW' in different sections to compare the contribution of each section for total 'COW' for the month 'X'
- Break up of COW within a section due to different wastes for the month 'X'
- 'Year to Date' inter section break up of 'COW'
- 'Year to Date' intra section break up of 'COW'
- Trend over months - Month to Date figures
- Trend over months - Year to Date figures

3.4. Waste Minimisation Audit

Cross-functional teams comprising of staff, officers and executives from different sections and plants were formed and imparted training on 'waste minimisation audit' to be conducted based on first principles of material balance. Waste minimisation audits are conducted in every plant basically to identify pollution prevention opportunities. The audit is conducted for a selected process by making a mass balance relationship as given below

$$\text{Inputs} = \text{Products} + \text{Materials Recovery} + \text{Waste discharge} + \text{Waste disposal}$$

Balancing this equation easily indicates opportunities for waste minimisation. Various alternatives for waste minimisation are developed after identification of these opportunities and prioritized based on economic and environmental benefits, operational easiness and other factors.

4. Conclusion

Experience in hazardous waste management at APIL clearly indicates that the first priority should be to reduce hazardous waste generation at source. Waste reduction is a practical option even though it is not possible to estimate the upper limit of what is technically and economically possible. Waste reduction will lessen the environmental impact, lower the operation cost, decrease complexity of waste management and reduce potential liability.

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