

Research Article

Transboundary Movements of Hazardous Waste in India and Control on Dumping

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ABSTRACT

The present work is an effort to control dumping of solid hazardous waste in India by using modern scientific technique of Atomic Absorption Spectrometry as a monitoring analytical tool. In this context sample drawn from import consignments of metallic residues i.e Brass dross and zinc ash have been investigated by using AAS technique and established a methodology by which, shipment consisting of hazardous waste can be scientifically monitored and dumping of such waste can be efficiently controlled.

Keywords: Hazardous waste, Atomic absorption spectrometry, Flame emission.

INTRODUCTION

The flow of goods across international borders has increased dramatically over the last several decades. In many cases, this expansion in international trade has increased the quantity and variety of useful products available to consumers around the world. (Rummel-Bulskal, Iwona 1990). Yet trans boundary trade also has included legal and illegal shipments of substances that, if used or disposed of improperly, can have harmful effects on human health and the environment. To minimize these environmental and human health impacts, governments have attempted to control, or in some cases ban, trade of potentially hazardous substances. (Environment Protection Act, Gol-1986). Often these objectives are accomplished through the adoption of international treaties and the implementation of national and international information-sharing networks (UNEP 1989). In addition, national, bilateral, and multilateral monitoring, inspection, and enforcement efforts have had some success in effectively managing legal trade and reducing illegal trade flows of hazardous substances.

While international efforts to manage legal trade and reduce illegal trade have made progress, many problems still remain. Inconsistent definitions of hazardous substances, inadequate information on legal and illegal trade, issue of chemical analysis and identification of hazardous wastes its inspection, monitoring and enforcement,

continue to complicate the debate (Radecki, W. 1992). Nevertheless, it is hoped that the information in this analytical research document will help environmental decision makers, international trade policy makers, enforcement and monitoring agencies, customs and revenue control laboratories to understand these issues and will allow for more informed development of environmental policies and programs for effective management and enforcement to control the trans boundary trade of potentially hazardous substances (Klem S. 1994).

CONTROL MEASURES

Although the issues surrounding legal and illegal Transboundary shipments of hazardous waste are complex, but it can be controlled by systematic Planning, strict Enforcement and Compliance Promotion approaches. Proper implementation of Multilateral Treaties and Agreements; International and Customs Policing Methods; Integrated Cooperation among Government Agencies can definitely leads towards solution of this complex problem. After implementation all the above measures next important step is Monitoring of Import and Export consignments by instrumental methods at customs laboratories as gateway to control & restrict the entry of the hazardous waste to the developing country like India. Most of the hazardous waste can be analyzed, identified and monitored by modern scientific instruments like Atomic Absorptions

spectrometer and Gas Chromatograph-Mass Spectrometer.

Major portion of hazardous waste dumping in India in the solid forms are in the name of metallic residues import (Brass Dross Zinc Ash Copper Dross etc.) for reprocessing (E.P.A-1986). To ascertain whether there is an illegal trans boundary movement of hazardous waste in India is continued, 08 Nos. of samples drawn from different import consignment of metallic residue had been analyzed which are given as under-

- (i) Imp-359/04-12-06,
- (ii) Imp-798/03-02-06
- (iii) Imp-359/04-12-06
- (iv) Imp-343/22-11-06
- (v) Imp-271/07-09-06
- (vi) Imp-128/03-07-06
- (vii) Imp-308/03-11-06
- (viii) Imp-342/21-11-06,

These metallic residues mainly contains Lead, Cadmium and Arsenic as hazardous substance which can be easily analyzed by using Flame atomic absorption spectrometry, a powerful technique for trace analysis. About 70 out of 92 elements can be estimated at parts per million levels by this method and if the amount of hazardous elements are found more than the prescribed limit than the shipments move can be restricted. This technique is also used in *metallurgy, geology, mineral prospecting, medicine, agriculture and pollution monitoring.*

EXPERIMENTAL

The waste metal is dissolved using a microwave digestion procedure. The solution is then analyzed using Atomic Absorption Spectroscopy method to determine the lead and cadmium content.

Analysis for Lead

- Turn the lead lamp on and allow it to warm up for approximately 10 minutes.
- Optimize the burner head position and flame conditions of the AA using the 5 ppm lead calibration standard (typical absorbance is around 0.090 to 0.095).

- Analyze the blank solution, followed by the 250 ppb lead standard, the 500 ppb lead standard, the 1 ppm lead standard, the 2.5 ppm lead standard and the 5 ppm lead standard to create a calibration curve (linear through zero). Ensure the calibration curve is linear.

- Auto zero the signal and analyze the digested SRMs and each of the digested samples. Turn the lead lamp off.

Analysis for Cadmium

- Turn the cadmium lamp on and allow it to warm up for approximately 10 minutes.

- Optimize the burner head position and flame conditions of the AA using the 500 ppb cadmium calibration standard (typical absorbance is around 0.175 to 0.185).

- Analyze the blank solution, followed by the 50 ppb cadmium standard, the 100 ppb cadmium standard, the 250 ppb cadmium standard, the 500 ppb cadmium standard and the 1 ppm cadmium standard to create a calibration curve (nonlinear through zero). Ensure the calibration curve is not "s-shaped".

- Auto zero the signal and analyze the digested SRMs and each of the digested samples.

- Turn the cadmium lamp off.

- The results are reported in percent by weight (wt%) on the basis of the actual weight of the original sample taken.

Results of lead and cadmium in Brass Dross

Total 08 Nos of samples have been drawn from the various import consignment of brass dross and zinc ash and analyzed by using Atomic Absorption Spectrometry, the results of analysis are given below –

Table : Content of Lead and Cadmium in Brass Dross

S. No	Sample Control /Lab No.	Description of Sample	% of Lead *	% of Cadmium *
1	IMP-141/14.7.06	Brass Dross	2.75	0.026
2	IMP-798/3.2.06	Brass Dross	0.66	0.168
3	IMP-359/4.12.06	Brass Dross	1.88	0.030
4	IMP-343/22.11.06	Brass Dross	1.68	0.025

Results of lead and cadmium in Zinc Ash
Table: Content of Lead and Cadmium in Zinc Ash

S. No	Sample Control Lab No.	Description of Sample	% of Lead *	% of Cadmium *
1	IMP-271/7.9.06	Zinc Ash	0.97	0.077
2	IMP-128/3.7.06	Zinc Ash	1.00	0.081
3	IMP-308/3.11.06	Zinc Ash	2.20	0.077
4	IMP-342/21.11.06	Zinc Ash	1.12	0.338

DISCUSSION

Govt. of India has taken a serious view on dumping of hazardous waste in India by trans boundary movements and made some policy to control the same, which are in the form of Export Import policy and Hazardous waste management & handling rule, under the scope of Environment Protection Act 1986. As per the policy ***“Hazardous waste from any country to India should not be permitted for dumping & disposal; however import of such waste may be allowed for processing or reuse as raw material, after proper examination of each case.”***

In this context prohibited list of hazardous waste has been published by Ministry of Environment & Forest mentioning various hazardous substances and their limits to say whether it is hazardous waste or otherwise.

During the research on the topic samples of metallic residues that i.e. Brass Dross, Zinc Ash, Zinc skimming have been drawn from the import consignment and analyzed for the presence of only two metallic hazardous substances that is Lead & Cadmium.

As per the prohibited list of hazardous waste, if any imported metallic residues, contain more than 1.25% of Lead and more than 0.1% Cadmium then the goods will be considered as hazardous waste.

CONCLUSION

As per the results above, three out of the four samples of brass dross having Lead content more than the permissible limit of 1.25%, however the fourth sample of brass dross having Cadmium content more than the permissible limit of 0.1%. Accordingly the goods imported vide above mentioned consignments comes under hazardous waste.

As far as the result of Zinc ash is concerned, one out of the four samples is having Lead content more than the permissible limit of 1.25%. Also another one samples is having Cadmium content more than the permissible limit of 0.1 %. Accordingly the goods imported vide above mentioned two consignment of Zinc ash comes under hazardous waste.

In view of the above it is concluded that the dumping of hazardous waste in India by trans boundary movement is continued, on the name of import for reprocessing / reuse. The

problem of dumping of hazardous waste can be controlled by proper screening, monitoring and analysis of import consignments at the gateways by using modern scientific instruments.

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