

Waste Management Practices at Çayeli Bakır İşletmeleri A.Ş.

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ABSTRACT: Industrial processes generate a number of industrial wastes in many forms (solid, liquid and gaseous states). Such waste may be harmful to the environment, either because of the volume produced or the damage it could cause if not disposed of properly. ÇBI, as an environment-conscious company, is committed to protecting the local environment in which it operates and has adopted a waste management program which is designed to eliminate any negative impact on the natural environment because of the operation.

1 INTRODUCTION

Çayeli Bakır İşletmeleri A.Ş. (ÇBİ) is a copper-zinc mine located in the northeast part of Turkey. It started producing copper and zinc concentrates in late 1994 (Fig. 1). The mine is a joint venture of Inmet Mining of Canada, Eti Holding, and Gama Endüstri ve Pazarlama A.S. There are 386 employees and operation continues seven days a week and 24 hours a day. The size of the facility and acreage of the property are 16,700 m² and 584,605 m² respectively. In the year 2000, 860,763 tonnes of ore were milled, from which 148,366 tonnes of copper concentrate and 51,370 tonnes of zinc concentrate were extracted.

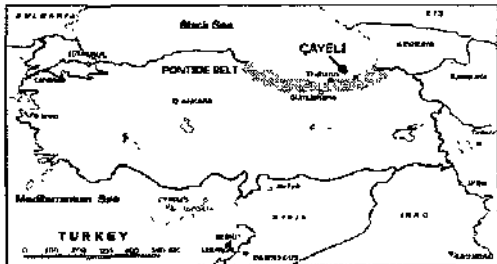


Figure 1. Location of Çayeli Mine.

Çayeli Bakır İşletmeleri recognizes that industrial waste can be harmful to the natural environment, and understands its role as a leading mining company in Turkey with respect to protection of the environment. For this reason, ÇBİ developed a Waste Management Program in order to:

- (i) establish protection of the local and global environment;
- (ii) implement strategies to:
 - a) refuse products that because of their volume, excessive packaging, or toxicity may harm the environment,
 - b) reduce the amount of waste, either by using lesser quantities or reducing the size of the waste generated,
 - c) recycle waste, either within ÇBİ's operations, community programs or through private enterprises,
 - d) reuse waste materials in any phase of its operations;
- (Hi) establish and maintain consistent work practices that would reduce or eliminate the generation of waste;
- (iv) comply with legislation and company policies and procedures.

In this paper, waste management practices at CBI are briefly described.

2 WASTE IDENTIFICATION AND CLASSIFICATION

2.1 Waste Identification

For the identification of wastes, the following four basic questions need to be answered:

1. Can it be used somewhere else in the process?
2. Can it be recycled internally or externally?
3. Does it have a potential to contaminate the air, the land or the waterways?
4. Does it need special treatment prior to disposal?

2.2 Waste Classification

Wastes are basically divided into two major groups at CBI:

- hazardous,
- non-hazardous.

2.2.1 Hazardous Waste

Hazardous wastes are those which are toxic, infectious, flammable, eco-toxic, corrosive, etc., which

have the potential to cause harm to human or animal life or to the environment, producing either short- or long-term effects.

The Turkish Environmental Regulation (TER) mandates that hazardous wastes are to have separate collection, packaging and storage before disposal. The list of hazardous wastes commonly found at CBI is given in Table I.

Table 1. List of hazardous wastes at CBI.

TYPE OF WASTE*	REGULATORY WASTE CODES	TOTAL AMOUNT-	HAZARDS	DISPOSAL METHODS OF CBI	METHOD OF REGULATED DISPOSAL
MEDICAL WASTES*	Y1	10 Kg/mo	Infectious Pathological Toxic	D10	D10, D5, R1
LUBRICANTS*	Y9	1350 Kg/mo	Flammable- Combustible Eco-toxic	D10	D9, D10, R1, R9
CHEMICALS*	Y14	850 Kg/mo	Toxic, eco-toxic Corrosive, oxidant Flammable, explosive	D10	D5, D9, D10
BATTERIES*	Y31	250 Kg/mo	Toxic Eco-toxic	R4	D9, R4
TAILINGS	Y22 Y23	370 m ³ /hr	Eco-toxic Corrosive Toxic	Deep Sea Discharge, R4	D10, D5, D9, R4

* Through the use of contractor

D5-Storage on land by special treatment R1-Use as fuel or use for production of energy R9-Refining of fused oils or
D9- Physical-chemical treatment R4- Improvement/recycling of metals and metallic other uses of previously
D10-Burning compounds utilized oils

2.2.2 Non-Hazardous Wastes

Non-hazardous wastes are those that are not harmful to human or animal life or to the environment.

However, because of their volume or low degradable rate, they must be disposed of in a man-

ner that will minimise the negative long-term effect on the environment.

Non-hazardous waste can be recycled, reused, reduced in volume, etc. The list of non-hazardous wastes commonly found at CBI is given in Table 2.

Table 2. List of non-hazardous wastes at CBI.

TYPE OF WASTE	TOTAL AMOUNT	DISPOSAL METHOD OF CBI*	METHOD OF REGULATED DISPOSAL
Scrap metal	17800 kg/mo	Recycle, reuse	Recycle, landfill
Scrap wood	1700 kg/mo	Reuse	Reuse, landfill
Scrap plastic and nylon	500 kg/mo	Recycle, landfill	Reuse, recycle, landfill
Scrap rubber and tires	1000 kg/mo	Reuse, recycle	Reuse, recycle, landfill
Domestic wastes	15 ton/mo	Landfill	Landfill
Electrical cables	100 kg/mo	Reuse, Recycle	Reuse, recycle, landfill

(*) Through the use of contractors

3 WASTE SEGREGATION

Segregation refers to the physical separation of waste according to classification, compatibility and hazards to employees, the premises or surrounding properties.

Wastes can be segregated in the simplest form: hazardous (to humans or to the environment) and non-hazardous. Furthermore, each of these basic groups can be divided into subgroups by considering their chemical compatibility, degree of toxicity, degree of corrosion, whether they are solid, liquid or compressed gases, their shipping requirements, etc.

3.1 Hazardous waste

Hazardous wastes are segregated according to the requirements of the Turkish Environmental Regulation. The main groups are given below.

a) Medical Waste

The medical wastes of the health unit located on the site are collected and treated as separate from the others. Medical wastes are put in red plastic bags with a thickness of 150 microns. Each bag is then put in a secondary plastic bag with an international biohazard sign on both sides. The bags are kept in a closed hazardous waste container until transportation for disposal. Medical wastes are sent to an incineration plant at regular intervals for disposal.

b) Lubricants

Used oil, oil filters, greases and anti-freeze, etc. are collected in steel barrels and the barrels are labeled with a proper label which shows the content. Oil- or grease-contaminated hoses, rags, gloves, sawdust, clothing, etc. are collected in durable plastic bags at the work areas, and then they are transferred to plastic-lined bags with proper labels. The bags are transported to a temporary storage area on the site and stored until they are transported from the site for disposal.

c) Chemicals

Chemical wastes (expired, out of standard, contaminated, etc.) are collected in steel or plastic barrels with proper labels. Chemical-contaminated bags, rags, etc. are also collected in labeled plastic-lined bags.

d) Copper- and Zinc-Contaminated Wastes

Because of the nature of the operation, CBI generates copper and zinc concentrate- or ore-contaminated wastes at the site such as mill filter

cloths, rags, filter plates, etc. These wastes are also classified as hazardous waste at CBI and they are collected in the labeled 1m³ bags for disposal.

e) Others

Wastes which do not fit into the above groups are separated and packaged according to their properties and according to the TER.

3.2 Non Hazardous waste

Non-hazardous wastes are segregated into the following groups:

a) Scrap Metal

CBI's main non-hazardous waste is scrap metal. Most of the scrap metal is generated by the mine and maintenance departments. Scrap metal is collected at the scrap metal bin on site.

b) Scrap Wood

Another large amount of non-hazardous waste is scrap wood. The main source of the wood is the packaging of goods received on the site (chemicals, spare parts, etc.). Scrap wood is collected at the scrap wood storage bin on site.

c) Scrap Plastics

Reagent bags and drums are the main sources of the scrap plastic. All plastic drums and bags are washed and rinsed three times by the operating departments before they are transported to the serai plastic storage area.

d) Scrap tires and rubber

Damaged or used tires and scrap rubber are collected separately and stored at their designated location.

e) Other Waste Materials

Non-hazardous wastes which do not fit into the above groups are segregated as others.

3.3 Packaging

a) Hazardous Wastes

i) Liquid Waste

Liquid hazardous wastes are collected in plastic or metal barrels. The barrels used for this purpose are fitted with covers. After filling, the covers of the barrels are closed tight to prevent spillage. The

barrels that are used for the collection of waste in the departments are labeled properly to show content before transport to the temporary hazardous waste storage area. Before the transportation of the barrels to the temporary waste storage area, the departments follow these steps:

- each barrel is labelled properly,
- barrels are placed on pallets (four drums per pallet),
- the drums on the pallets are tied to each other,
- the drums have a cover and there is no leakage from the drums,
- waste drums are not damaged; if they are damaged at a later stage, the waste is moved to another drum immediately.

ii) *Solid wastes*

Hazardous solid wastes are collected by the departments which produce them, and they are placed in labeled collection drums which have a plastic bag liner. Once full, the waste collected in the barrels is transferred to labeled and plastic-lined 1m³ bags and the bags are transported to the temporary storage area.

b) *Non-Hazardous Wastes*

Non-hazardous wastes are physically segregated and stored in designated collection bins.

c) *Labelling*

Proper labelling of the wastes is an important element of the waste management program of CBI. A color-code labeling system was developed for the hazardous wastes. There is a color code for each main group that generates waste on the site. Those groups are the mine, mill, surface workshop, and underground workshop.

The labels are in both Turkish and English and the name of the waste, the transportation date to the hazardous waste storage area and the person who transported the waste is recorded on the labels and posted on the waste container before the transportation takes place.

Groups are not allowed to use any other label than their own and two labels are posted on the containers (one on top of the container and the other one on the side). 1m³ bags are also labeled along the same principles.

4 TEMPORARY STORAGE

CBI constructed a waste storage area as part of its waste management program. The waste storage

area is intended to accomplish the following main purposes:

- to collect hazardous and non-hazardous wastes in the dedicated place only;
- to allow easy access to the wastes for waste segregation, salvaging and disposal;
- to allow efficient, concentrated control in the case of emergencies;
- to minimize support installations (eyewash stations, emergency showers, spill response equipment, etc.).

4.1 *Hazardous waste storage area*

The hazardous waste storage area has the following features:

- the storage area has a concrete floor with secondary containing walls to prevent spills from leaking from the storage area;
- the storage area has a roof to prevent the wastes from becoming exposed to direct sunlight, rain or snow;
- initial fire response equipment is available at the storage area;
- spill control equipment is readily available;
- emergency showers and eyewash stations are available and operational, to be used in the case of personal exposure to the wastes;
- the storage area is locked at all times and only authorized employees are allowed to enter the storage area;
- the storage area has enough capacity to hold wastes generated on the site over a period of three months.

4.2 *Non-hazardous waste storage area*

This area has five bins for different types of waste. The floor of the storage area is concrete and concrete walls separate the bins. There are bins for scrap metal, scrap wood, scrap plastic, used tires and rubber and other wastes. Before any scrap material is dumped in the bins, the departments fill out a "Waste Declaration Form" and send a copy of that form to the Safety, Health and Environment Department.

5 TRANSPORTATION

Hazardous wastes of CBI are transported to an incineration plant with a licensed hazardous waste transportation company. The transportation company employees are trained and certified to handle hazardous wastes, including the loading and unloading of the truck. CBI is responsible for packaging and labeling of the wastes before they are loaded onto the truck.

Waste loading is performed by CBI employees under the supervision of the transportation company. Hazardous wastes are transported to the incineration plant at quarterly intervals. During that process, three copies of the waste transportation form are filled out, which is a requirement of the TER.

Non-hazardous wastes are collected by the local contractor and transported from the site

6 DISPOSAL

CBI fulfils the requirements of the Turkish Environmental Regulation for the disposal of hazardous wastes. All hazardous wastes of CBI are transported to the incineration plant for disposal. The disposal method is decided by the incineration company according to the nature of the wastes.

Non-hazardous wastes are sold to local contractors for recycling.

7 CONCLUSIONS

A waste management program is an important element of mining operations and should be established by considering legislation or, in the absence of legislation, internationally accepted best management practices. There are many benefits of a sound waste management program for the operators. Those benefits can be summarized as cost saving, risk elimination, improved process control, improved community relations and an enhanced corporate image.

REFERENCES

Safety, Health and Environmental Management Manual of
CBI
Turkish Environmental Regulation

