

CASE STUDY 2: THE MANAGEMENT OF HAZARDOUS WASTE IN SOUTH AFRICA

G.E. Blight

University of the Witwatersrand, Johannesburg, South Africa

Keywords: South Africa, hazardous waste, minimum requirements, waste management, hazard rating, acceptable risk levels.

Contents

1. Introduction: Origins of the Hazardous Waste Problem in South Africa
 2. The Hazard Rating System
 3. Records of Hazardous Waste Production
 4. Landfills for Receiving Treated Hazardous Waste
 5. The Effect of Co-disposal on Emissions of Hazardous Substances from a Landfill
 6. Faults of the Minimum Requirements for Hazardous Waste Disposal
 7. The Future
- Glossary
Bibliography
Biographical Sketch

Summary

South Africa has large mining and industrial sectors but cannot be regarded as an industrialized or developed country. The gross national product per capita is only US\$ 1800, and the level of unemployment is about 40% of the economically active sector of the population. Non-payment for services provided by local municipal councils became a form of protest during the "apartheid years," and levels of payment have since remained low despite efforts by the new government to persuade the population that non-payment is no longer patriotic.

At the same time, the population growth rate in developing communities (which comprise 80% of the population) continues at an extremely high rate of 2.4% per year. Spending of scarce resources, even on services as vital to community health as hazardous waste management, must therefore be carefully prioritized. The development of rational and affordable standards for the management and disposal of hazardous waste is one way in which expenditure on health-related service provision can be optimized.

In terms of South Africa's Environment Conservation Act (Act 73 of 1989), legislative power for the control of pollution caused by waste disposal sites is vested in the Minister of Water Affairs and Forestry. To date, control has been achieved by means of a landfill site permitting system. As a further measure, a committee was formed by the Department of Water Affairs and Forestry in 1990 to formulate a system of minimum requirements for the management and disposal of hazardous waste. This document was released as a first draft in 1994 and a new version, revised on the basis of experience, was published in late 1998.

The objective of the minimum requirements is to ensure that the most cost-effective means are employed to protect the environment and public health from the adverse impacts of hazardous waste disposal. Central to the Minimum Requirements are a Hazard Rating system and the principle of Acceptable Risk Level. The Hazard Rating provides an assessment of the risk posed by hazardous substances in any waste, while the Acceptable Risk Level provides the basis for the engineering design of hazardous waste disposal sites.

1. Introduction: Origins of the Hazardous Waste Problem in South Africa

Compared with the rest of Africa and many other developing countries, South Africa has large mining and industrial sectors. It produces more electricity than the rest of Africa put together, and some neighboring countries like Zimbabwe are partially dependent on South Africa for their electrical power supply. The production of South Africa's mining industry has declined in recent years, but it still rates as the world's foremost producer of gold, chromite, titanium, vanadium and platinum group metals, and it is a major coal exporter as well.

Threats of international oil supply sanctions during the 1970s and 1980s resulted in the growth of the world's only commercial-scale oil-from-coal industry, and South Africa's relatively cheap electricity has led to the establishment of a large aluminum smelting industry. Industrial growth in South Africa arose as a result of the discovery of mineral deposits and the consequent establishment of a mining industry. An explosives manufacturing industry was set up to provide mining explosives as early as 1890, and a fledgling chemical industry produced process chemicals for metals extraction and other metallurgical needs from the early 1900s.

Both the mines and their supporting industries grew and were organized as extensions of British colonial government and were made possible, as well as highly profitable, by the exploitation of cheap indigenous labour. The following two quotations illustrate the contrasting attitudes of mine owners and labour with respect to the Pass Laws, which required that every black person carry a pass and which were used to control the supply of labour to the mines and to industry:

'The whole intention of the pass laws is to have a hold on the natives whom we have brought to the mines, be it from the East Coast, South or from the North, at considerable outlay to ourselves.'

- *Chamber of Mines.*

'The Pass law is nothing but slavery and forced labour. It was made to force the natives to work.' - *D.S. Letanka, Transvaal Native Congress.*

(The Chamber of Mines was, and is, an association of mine owners. The Transvaal Native Congress was an early black political organization.)

The provision of an assured supply of cheap labour required the regimentation of the indigenous population, and this, put together with the social customs and prejudices of

British colonizers, led directly to the development of the apartheid system, under which black people were regarded as a renewable labour source rather than humans.

When South Africa was governed by the apartheid system, it was regarded by its white citizens as a rich country because its mining and industrial production mainly benefited the white population. Once apartheid was abolished, however, the white minority population realized that far from being a wealthy developed nation, South Africa was actually a rather poor developing nation.

The gross national product per capita is only US\$1800, and levels of unemployment constitute about 40% of the economically active (working age) sector of the population. Non-payment for services provided by local municipal councils became a form of protest during the "apartheid years", and levels of payment since then have remained low despite efforts by the new government to persuade the population that non-payment is no longer patriotic.

At the same time, the population growth rate in developing communities (which comprise 80% of the population) continues at an extremely high rate of 2.4% per year. This, together with a raging HIV-AIDS epidemic, has meant that spending scarce resources, even on services as vital to community health as hazardous waste management, has to be prioritized and optimized.

As the preceding paragraphs have indicated, apart from domestic waste, South Africa's waste management problem is related mainly to mining and industrial wastes, much of which arises from industries serving the mining industry.

Mining waste is not generally thought of as "hazardous" waste and will not be included in the term in this article. Nevertheless, it must be emphasized that the disposal of mine waste has health, safety and environmental hazards inextricably associated with it. In 1974, a mine tailings dam at the Bafokeng platinum mine failed, resulting in a mud-flow that killed 13 miners and caused serious and long-lasting environmental damage downstream.

A similar failure in 1994 at the Merriespruit gold mine killed 17 men, women and children. At the time of writing, a class action law suit is in progress in a British court with former workers in South African asbestos mines (now closed) and their families suing the British mining company that owned the mines because of health problems (mainly lung cancer) caused by airborne asbestos fibres.

These were ingested during work in the underground mines, as well as on the surface. Much of the airborne fibre originated from surface waste dumps, and fibres carried by the wind also affected the health of the workers' nearby family members.

The mining industry in South Africa, until recently, had always adopted a cavalier attitude to health and safety that arose from their attitude toward their workers. In every case, the profit motive was the first consideration. Health, safety and sound waste management incurred costs that reduced profits and hence were accorded a low priority.

As a result, the mining industry operated with standards that were based on what they could get away with without incurring excessive legal penalties and costs. Attitudes began to change when South Africa's first reasonably comprehensive environmental legislation was introduced in 1989, almost twenty years after similar legislation was passed in USA. There is still a lingering tendency, however, to minimize the importance of industrial health and safety.

The 1989 Environmental Conservation Act established the basis for the control of pollution caused by waste disposal sites, and the power to implement this act is vested in the Minister of Water Affairs and Forestry. To date, the provisions of the act have been enforced by means of a landfill site permitting system, and in 1990 the Department of Water Affairs and Forestry also formed a committee to formulate a set of "minimum requirements" for the management and disposal of hazardous waste.

This document was released as a first draft in 1994, and it is being implemented on a trial basis as part of the permitting system to promote compliance with environmental policy and legislation. A second version of the minimum requirements, revised on the basis of experience, was published in late 1998.

The "Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste" is one of the three minimum requirements documents produced and published together by the committee in 1994.

The other two documents, which are intended to be used together with the minimum requirements for hazardous waste, are "Minimum Requirements for Waste Disposal by Landfill", and "Minimum Requirements of Monitoring at Waste Management Facilities".

The objective of the minimum requirements is to ensure that the most cost-effective means are employed to protect the environment and public health from the adverse impacts of improper hazardous waste disposal. Waste management must be carefully planned and the following goals must be priorities:

- Waste prevention and avoidance, possibly by regulation;
- Waste minimization by means of clean technology;
- Resource recovery by recycling or recovery of energy through incineration or biodegradation, and
- Treatment to reduce volume or hazard; and safe disposal of waste so that it will not pollute or cause health hazards.

More information is provided in Box 1.

Box1. Quarter of South African Medical Waste is dumped

According to a survey done by a company called Enviroserv Holdings Limited, up to one quarter of the 2000 tons of medical waste produced in South Africa every month is dumped illegally in the environment. The illegal disposal of this waste, which includes human body parts, Hepatitis B and HIV-contaminated syringes and needles, blood, swabs and other potentially infectious materials, is seen as a real threat to public health, and Provincial Health Minister Peter Marais said that he is considering new legislation that would regulate the disposal of medical waste in the Western Cape to prevent people from unwittingly contracting diseases like HIV. In addition, a team headed by the chief director of health has been appointed to report cases of medical waste dumping since several significant incidents have raised alarm.

Source:

Maneli, Joyful Lamli. Quarter of medical waste dumped, says expert. Independent Newspapers, 1998.

TO ACCESS ALL THE 12 PAGES OF THIS CHAPTER,
Visit: <http://www.eolss.net/Eolss-sampleAllChapter.aspx>

Bibliography

Callinicos, L. (1981). *A People's History of South Africa*, Vol. 1, *Gold and Workers, 1886-1924*, 112pp., ISBN 0-86975-1119-0. Johannesburg, South Africa: Ravan Press. [This presents a detailed history of the development of mining in South Africa together with accounts of living, working and health conditions for black and white miners.]

South African Department of Water Affairs and Forestry, 2nd Edition (1998). Vol. 1, *Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste*, 148pp., ISBN 0-620-22995-0; Vol. 2, *Minimum Requirements for Water Disposal by Landfill*, 230pp., ISBN 0-620-22993-4; Vol. 3, *Minimum Requirements for Monitoring at Waste Management Facilities*, 52pp., ISBN 0-621-16295-7. The Department, Pretoria, South Africa. [These documents form the basis for the control of waste management in South Africa.]

Viljoen, M.J. and Reimold, W.U. (1999). *An Introduction to South Africa's Geological and Mining Heritage*, 193pp., ISBN 0-86999-941-9. Johannesburg South Africa: Mintek. [This describes the geology and mineralogy of the most important South African ore deposits.]

Biographical Sketch

Geoff Blight is Emeritus Professor of Civil Engineering at Witwatersrand University, Johannesburg, South Africa. He has a PhD from Imperial College, London, DSc(Eng) degrees from London, Cape Town and Witwatersrand Universities and a D(Eng) degree from Witwatersrand University. In the past 40 years, he has published over 280 papers in the fields of mine and municipal solid waste management, partly saturated and residual soils, silo pressures and durability of concrete. He authored the South African guidelines on tailings dam design and co-authored the South African guidelines on landfill design.

He has a particular interest in how climatic conditions affect the behavior of soils, mine waste deposits and landfills for municipal and hazardous wastes, as well as the durability of concrete.

UNESCO – EOLSS
SAMPLE CHAPTERS