A review of the pre-assessment and assessment techniques used in waste minimisation audits

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Abstract

Waste minimisation is a useful tool for reducing raw material and utility consumption and consequently the generation of waste. A specific area, in which it has been successfully applied by industry with significant financial and environmental savings, is water minimisation. Recent years have seen the development of a large number of pre-assessment and assessment techniques for respectively identifying waste minimisation focus areas (opportunities) or options (solutions) during a waste minimisation audit. This paper critically reviews these techniques and assesses their relative merits. The pre-assessment techniques are analysed in terms of their ease and speed of implementation, whilst the usefulness and applications of the available general assessment techniques are considered.

Keywords: waste minimisation, wastewater, focus areas, opportunities, solutions

Introduction

What is waste minimisation?

Waste minimisation has been defined as the 'prevention and/or reduction in the generation of waste; the improvement in the quality of waste generated, including reduction of hazard; and the encouragement of reuse, recycling and recovery' (IWM, 1996). In South Africa and the UK, however, a more narrow definition is often used: waste minimisation refers to the reduction or elimination of the generation of waste at source (IWM, 1996; Barclay and Buckley, 2000). Waste minimisation thus considers raw materials, water and energy consumption; and the resultant solid, liquid and gaseous wastes produced (March Consulting Group, 1999). Hence waste minimisation is at the top of the waste management hierarchy (Fig. 1).

The overall aims of a waste minimisation programme are the maximisation of business efficiency and the reduction of the company's impact on the environment (March Consulting Group, 1999). Benefits to the companies include cost savings, environmental improvement, increased throughput, and risk and liability reduction. Cost savings are incurred through the reduction of effluent treatment and waste disposal costs, the improvement of product yield as well as the reduced requirement for raw materials and utilities (Envirowise, 1996a; Petek and Glavic, 1996; Barclay and Buckley, 2000; Barclay and Buckley, 2002). Environmental improvement is observed as a result of the reduction in the consumption of materials and natural resources. Hence improved compliance with environmental regulations and legislation result (March Consulting Group, 1999; Barclay and Buckley, 2000). Increased throughput in a company is due to **process intensification**, which leads to decreased capital expenditure (Envirowise, 1996a). Due to the minimisation of the waste from a process, the associated environmental risks and liabilities in the workplace and the natural environment are simultaneously reduced. There is thus a better understanding, control and management of present risks and future liabilities within a company (Envirowise, 1996a).

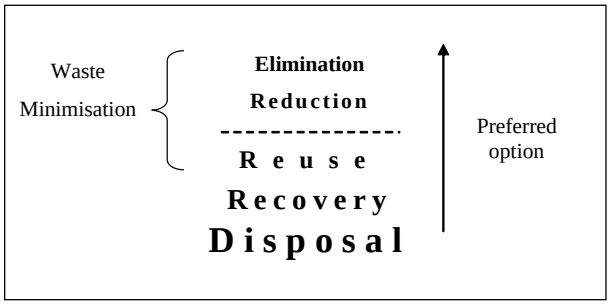

Figure 1
Waste management hierarchy (Phillips et al., 2002)

Why is waste minimisation important with regard to water?

A variety of drivers towards water and wastewater minimisation in industry have been identified. These include the following (Goldblatt et al., 1993; Rosain, 1993; Wang and Smith, 1993; Envirowise, 1996b; 1997):

- Reduced availability and increasing cost of fresh water
- Requirement for more stringent compliance with water discharge limits
- Increasing discharge costs
- 'Good neighbour' policy
- Avoidance of bottlenecks in industry where an increased volume of water is required and is not always available from the water company's piped distribution system.

In recent years, the responsibility of South Africa's companies to monitor waste continually and reduce the impact on their employ-

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