Chapter 8 Leachate Pollution and Impact to Environment

Oluwakemi Kehinde Fagbenro

Ladoke Akintola University of Technology, Nigeria

ABSTRACT

Pollution prevention is a step towards obtaining a green environment, and no amount of effort in that direction should be considered too great. To this effect, the pollution by leachate and the resultant impact on the environment is discussed in this chapter. Types and sources of pollution, their transfer and effect have been discussed, so as to give a background understanding on pollution and hence provide a platform for its control. The age old waste disposal practice of open dumps and landfilling is discussed, highlighting the dangers of indiscriminate waste dumping and uncontrolled landfilling practices. Although other sources of leachate generation are highlighted, the chapter focuses on leachates from municipal landfills and the effect of its migration. Engineered landfills also known as sanitary landfills have performed better in curtailing the movement of leachates, hence the use of artificial liners or low permeability soils such as the well compacted clayey soils, to eliminate or minimize leachate migration.

INTRODUCTION

Generation and disposal of waste is considered absolutely normal and a part of everyday living, but the crux of the matter is the means by which the waste should be disposed safely to avoid pollution and ensure a healthy environment.

Open dumping of waste on land or in water bodies has been practiced from ancient times, but it is imperative that continuous awareness be made of the pollution effect, especially because some of the polluted water served various purposes including household uses and irrigation among others. Also, the indiscriminate dumping of waste on the ground constitute an eye sore and produces stenches which was offensive to human senses.

Because of the aforementioned reasons, landfills are now more commonly used, in which wastes are buried in the ground. Unfortunately however, many so called landfills in the less civilized nations

DOI: 10.4018/978-1-4666-9610-5.ch008

may just be regarded as 'glorified open dumps'. Landfills must be controlled to remove the demerits of uncontrolled landfills, especially regarding the generation of wastewater called leachates, bad odors and related problems that may lead to the pollution of the environment.

THE ENVIRONMENT AND SUSTAINABILITY

The environment may be considered in two primary forms; the natural and built environments. While the natural environment includes all the living and non-living things on the earth, existing in their natural state, the built environment is essentially a modified form of the natural environment. This may occur even from very simple and unbiased agricultural practices, construction exercises and mining, intended for human benefits. Therefore, it can be inferred that a natural environment hardly exists. Although, the building up of an environment may be with a noble intention, however, many of such practices may also lead to the pollution of the environment.

Environmental pollution is considered largely related to industrial revolution and urbanization (Xu, et al., 2014) with the emergence of many great factories; unprecedented air pollution and the discharges of very large volumes of industrial chemical waste.

Considering the plausible exposure of the built environment to contamination and degradation, all hands must be on deck towards achieving a sustainable environment. In essence, it should be possible to develop the environment for desired benefits without destroying the environment or negatively altering the natural state of the environment.

There are many types of pollution coming from various sources and of various consequences. A basic understanding of pollution would provide the awareness necessary to help individuals in the minimization of their contributions to the dangers of environmental pollution. Various pollution types and sources which may impact both the natural environment and human health negatively are discussed. However, the focus of this chapter is the effect of leachate pollution on soil, surface and ground waters, especially those located within the immediate environment of the site.

POLLUTION

Pollution is considered as the introduction of contaminants also called pollutants into any natural system thereby causing an adverse effect on the latter. In like manner, environmental pollution is the deterioration of the environment by the introduction of many factors occurring in forms such as chemical substances, and or energy sources including noise, heat, and light. The major forms of pollution and their specific contaminants are highlighted in Table 1.

Air Pollution

Air Pollution involves the contamination of the atmosphere by altering air chemistry and composition. Contaminants exist in the form of particulate matter like the dust, excess gases such as carbon dioxide (CO_2) and vapors that are not efficiently removed by natural cycles like the nitrogen cycle or carbon cycle.

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