

Hygienic Private Sewage Disposal System in Saudi Arabia

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Received Date: 17 July 2020

Revised Date: 1 August 2020

Accepted Date: 06 August 2020

Abstract

The private sewage disposal system in the sandy soil of the Kingdom of Saudi Arabia (KSA) is an off-site pit latrine. It is found in some parts of big cities and small cities like Najran city. The high porosity and quick seepage of sandy soil encourage authority to adopt this system. This system poses a big pollution threat to the underground water which constitutes a big share in the drinking water in cities far away from the sea. This article discusses this problem and suggests a hygienic solution. To connect the in site sewerage system to a septic tank prior to the pit latrine will stop the solid sewage and waste to reach the pit latrine. Thus the pit latrine will be a soak-away pit. Consequently, the pollution of the groundwater will be minimized and the lifetime of the pit latrine will be elongated.

Keywords - off-site pit latrine, high porosity, and quick seepage of sandy soil, pollution, underground water, hygienic solution, septic tank.

I. INTRODUCTION

The Kingdom of Saudi Arabia is one of the largest countries in the Arabian Peninsula. Its' area is about 2.25 million km². According to 2010 census, its' total population is 26,090,555, living in 4,655,127 households. One-third of Saudi households live in apartments (34.3%); the rest are in traditional houses (26.9%), villa (36.4%) [1]. KSA depends on three kinds of water resources; non-renewable groundwater resources, renewable water resources, and desalinated seawater [2]. The average per capita water consumption in the Kingdom is estimated at 210 liters daily but it differs from one city to another depending on the type of the climate and the inhabitants' traditions of using water. The total demand for household water rose from 2.4 billion cubic meters of water in 2011 to 4.00 billion in 2020 with an annual growth rate of 5 to 7 percent. A total of 2.9 billion cubic meters of sewage is produced in households, which use approximately 3.6 billion cubic meters of drinking water, which is 80 percent of the total household consumption of water. [3]. Three types of sewage systems are used in the Kingdom - public

sewage, ditch sewage, and private sewage [1]. The main sewage disposal system in big cities in Saudi Arabia is the public sewer system, yet in some parts of these cities, and small cities like Najran city private sewage disposal system is used. Cesspool system does exist in an area not served by a public sewer in some cities like Jeddah city where the soil type is rocky. The type of private sewage system is evaluated in the light of local soil conditions, availability of local materials, manpower and facilities, construction and operation and maintenance costs, and preference of local authorities. Soak-away pit system is used in desert sandy soils [4]. This of course is an easy way of sewage disposal because of the virtue of high porosity and a quick seepage of sand. The problem lies in the high cost of the construction and maintenance of such practice. A reinforced concrete retaining wall is needed to stop the side soil from collapse; a frequent discharge of accumulated sewage soil and sludge is needed.

The sewage disposal in the ground contributes to the contamination of the underground water which is one of the main sources of drinking water in KSA [1]. Consequently, such contaminated water causes infectious diseases such as diarrhea and typhoid [5].

II. METHODOLOGY

I identified relevant studies by use of a comprehensive strategy including searches of published articles, reports issued by the local municipalities on the topic, and personal visits to building sites.

III. DISCUSSION

It is commonplace practice in some small cities in KSA to adopt off-site pit latrine as a private sewage disposal system, see photo 1 [6]. Its' depth is 6 to 7 meters with a diameter of 3 meters. A reinforced concrete retaining wall is built to avoid its' collapse. Each pit latrine is for a house or two flats. The family size according to the 2010 population census is 6 persons [7]. Thus 6 to 12 persons use one pit latrine. The lifetime of a pit latrine is about five to six years then it turns to be a cesspool that needs a discharge every month or so [8]. The off-site pit latrine is, therefore, a costly and polluted type of sewage



disposal system. If we add a two or three-chapters septic tank at the end of the internal sewerage system and before the pit latrine, solid free water will pour into the off-site pit which, turns to be a soak-away pit instead of on a pit latrine. This tremendous improvement in the quality of wastewater will result in hygienic uncontaminated groundwater. Consequently, a healthy population. The life span of the off-site pit will then double nearly ten times. The septic tank could be beneficial if the wastewater in the third chamber is used for irrigation plants. Also, the sludge could be used as a fertilizer. The standard size and material of septic tanks for any family size are available in the literature.

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FIGURES



Photo 1 Off-site Pit Latrine [6]