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MITIGATION OF HAZARDOUS AIR POLLUTANT EMISSIONS: VACUUM vs. CONVENTIONAL SEWER SYSTEM

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Abstract

The efforts to quantify gas emissions from wastewater handling have omitted the conveyance along sewers, lift stations, and manholes. This article compared the conventional system with the vacuum system based on sewer gas emissions. The goal of the study was to determine the emissions of methane, hydrogen sulphide, carbon dioxide and carbon monoxide at the level of the wet-wells of the conventional system and the exhaust of the vacuum system before and after the bio-filtration process by way of onsite measurements of sewer gases. The comparative analysis of the gas emissions from the two systems demonstrated that the emission level of methane in the conventional system was 1.83 times higher than that in the vacuum system. The hydrogen sulphide emissions in the conventional system was 3.09 times higher than the level of the same gas in the vacuum sewer system, while the concentrations of carbon dioxide and carbon monoxide in the conventional system were 6.24 times and 2.40 times higher, respectively. Despite the overall efficiency of the vacuum sewer system, the research indicated the need of replacing the biofilter's media on a regular basis for better performance in removing sewer gases. This study also provides scientific evidence that the vacuum technology can be used successfully in reducing sewer emissions of methane and hydrogen sulphide. The broader implication of the research is the proof that an available eco-innovative technology in wastewater collection is superior to a classical one in terms of environmental impact and ecological modernization.

Key words: biofiltration, conventional sewer system, global warming, sewer gases, vacuum sewer system

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