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Integrated Gravity-flow Anaerobic-Aerobic Zoned Adequate Wastewater Treatment System (iGAZA)

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Abstract

In emergency situations and crisis areas, an adequate wastewater treatment is crucial for safeguarding public health and the environment. In these scenarios, conventional wastewater treatment systems may be compromised or unavailable, requiring rapid, flexible, integrated, and reliable alternatives. This paper proposes a system for emergency wastewater treatment, focusing on its ability to address the unique challenges posed by such events. The key approach of this work includes: mobile treatment unit, decentralized system, localized materials, affordability, gravity flow, meeting basic standards, and easy to decommission. Additionally, considerations such as ease of operation, rapid deployment, and adaptability to varying wastewater qualities are considered. While challenges such as limited resources, power supply, and fluctuating wastewater characteristics remain, the use of portable and renewable energy-driven systems offers promising solutions. The system is consisting of different anaerobic zone, biogas vent system, aerobic zone, solar/wind aeration system, clarifier, and discharge/reuse system. Ultimately, ensuring effective wastewater management during emergencies is essential to prevent disease outbreaks, protect water resources, and support community recovery.