

Analysis of Environmental Risk Assessment and Management of Water and Wastewater Treatment Plants.

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Abstract:

Wastewater treatment facilities (WWTPs) are vitally important technological facilities for human and environmental health. In WWTPs, there are a wide range of technical procedures that relate to a wide range of failures. They may have unfavorable societal effects, such as a shortage of water supply, disease outbreaks, floods and so on. The nature and potential for harmful impacts on organisms such as humans, animals, plants, microbes or the surrounding environment such as soil, air, and surface or groundwater, due to their exposure to stressors are determined via environmental risk assessment (ERA). Assessment of possible environmental risks in WWTPs, as well as the development of preventative and mitigation techniques, is essential and imperative.

The goal of this study is to identify possible hazards and manage them utilizing hazard identification and risk assessment methodologies. The comprehensive evaluation process includes identifying the phenomena associated with risks, assessing the value of the risks, inquiring about the likelihood of their occurrence and frequency, and determining the extent of their acceptance. The evaluation was undertaken by classification according to their severity and impact on the environment and public health in general and their impact on the plant's operations and its internal environment. The results of the work were expressed as a risk matrix and risk map with a specific sequence of events and the impact of each. This allows for a faster response to hazardous situations and a better choice to prevent or mitigate. On the basis of ERA, new decisions and solutions are taken. Continuous monitoring of the operation of the treatment plant is carried out by assessing whether the measures taken are correct and whether they cause the deterioration of the general environment.

Introduction:

Defining the risk management process is complex due to the multiplicity and interdependence of the different scientific and economic fields in which it is applied comprehensively. It can be defined in a simplified form to determine the best way to diagnose and monitor potential risk control. Risk management and assessment should result in the risk being reached at an acceptable level that is not harmful. The risk assessment should lead to a specific situation in which the management of the treatment plants is aware of the presence of hazards identified in (ERA) during the operation of the plant takes into account its size, level such that it does not exceed the acceptable risk limit. In WWTPs, risk management can be described as the prevention of negative damage during operation and maintenance and the emphasis on reducing the size of the damage caused after the occurrence of such events. Risk assessment related to waste water treatment plants seeks to maintain the status of aquatic ecosystems, avoid additional harm, and promote the long-term conservation of water resources through sustainable development of water usage. Risk management is divided into two basic stages: risk assessment and risk monitoring. The components of assessment are identifying and assessing risks and determining the level of acceptance or not. Risk monitoring includes monitoring wastewater treatment processes, plant maintenance status and monitoring general changes.

Research Problem:

Risk assessment is carried out to create a standardized strategy to assessing and monitoring risks, which will influence risk management planning and risk reduction by government organizations and other stakeholders. The necessity of risk assessment is to investigate the likelihood and consequences of harmful events, and each official organization must do a systematic risk assessment once to implementing any initiatives. Pollution caused by poor wastewater and sewage infrastructure has a direct influence on

inhabitants and the environment, according to treatment operations. The following issues are identified by WWTPs, with some of them highlighted:

- The WWTPs is operating at capacity, with a large intake at the inlet.
- Screenings, grit, and sludge have not been properly disposed of on site.
- Since there's no outflow monitor at the effluent discharge site, the final effluent is released without being examined.
- The majority of the effluent is discharged into surrounding grazing land and streams due to overflow of the WWTPs. The concentration of solids and foam on the treated effluent would harm the receiving water.
- There is a high risk of groundwater contamination.
- Pollution of the environment (air and waste); and
- The ultimate effluent is consumed by an animal (livestock).

Research Aim:

The directive's goal is to create a framework for protecting inland surface waters, brackish waters, coastal rivers and streams, and groundwater. It also strives to enhance the quality of aquatic ecosystems, avoid additional harm, and promote the long-term sustainability of water consumption that is based on long-term water resource preservation.

Objectives:

The main objectives were imagined to successfully create the desired aim:

- Identification of presence of micropollutants in the treated water and wastewater and associated risks, since most of the conventional treatment plants are not able to remove some of the micropollutants also named as priority/emerging pollutants.
- To examine the effects of not incorporating risk assessment into wastewater treatment plant modifications.
- To figure out how the wastewater treatment plant would affect the public and the environment.
- Making recommendations on the need of including risk assessment into the proposed wastewater treatment plant improvement.

Research Questions:

- What are the requirements of municipal policy for including risk assessment into the construction of wastewater treatment plants?
- What are the consequences of failing to include risk assessment in the design of wastewater treatment plants?
- What risk will wastewater treatment plant installation have on the environment and the community?
- What solutions might be given to emphasize the need of integrating the WWTP's risk assessment?

Future Scope:

The scope of the present research extends to:

- Simulating the reality of sewage treatment plants using GIS, applying its tools to assess environmental risks, developing an appropriate perception of the surrounding environment, and proposing a measure to reduce the imminent risks
- Explore and assess advanced environmental risks.
- Definition and classification of risks according to the method of wastewater treatment plant.
- Risk assessment modeling.
- Searching for the optimal solutions to mitigate risks related to sewage treatment technologies.