VIRTUAL EVENT
International Conference on
Management of Naturally Occurring Radioactive Material (NORM) in Industry
19–30 October 2020 #NORM2020

Contribution ID: **216** Type: **Poster**

Waste management for the raffinate solution produced from uranium ore processing

During the last decades, radioactive materials and radiation sources have been widely used in various fields such as energy production, industry, medicine, research, and agriculture. Various incidents and accidents could happen during these multi-field applications and would thus result in relatively large amounts of radioactive wastes and contaminated objects. Therefore, increasing attention has been made for the removal and recovering of metal ions that result from industrial and radioactive activities that generate large amounts of liquid waste which are classified as TENORM (Technologically Enhanced Naturally Occurring Radioactive Material). Various physicochemical and biological methods were studied for metal ions removal from solutions. The main objective of the present work is the development of a new process for removal of uranium, and the treatment of the raffinate solution produced from uranium ore processing at the Nuclear Materials Authority in Egypt so that the treated water is suitable for plant irrigation. Within this objective, different biochar materials were prepared from several kind of agriculture wastes as potential adsorbents. The different parameters affecting treatment methods and factors affecting uranium removal from raffinate solution were studied. Further, the best conditions for uranium removal were obtained and assessed. The paper will further elaborate on the management of the recovered TENORM materials.

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Session Classification: Session VI - Solutions for Residue and Waste Management

Track Classification: NORM Residue and Waste Management