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Advancing the Arizona State University Knowledge Enterprise

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Removal of Ionizable Resources and/or Contaminants from Sludge

Industrial sludges, such as municipal sewage sludges (MSS), are an abundant by-product of process flow and wastewater treatment. Of the 6.5 million metric tonnes of MSS produced annually in the U.S., >50% are applied on land as a soil amendment. This practice poses potential environmental and human health concerns. Screening of nationally representative MSS samples showed the presence of 130 contaminants of emerging concern, of which 54% were identified as ionizable organic contaminants (IOCs). There is increasing evidence that these pollutants leach out from land-applied MSS to contaminate water, disrupt endocrine activity, and contribute to the development of antibiotic resistance in the environment.

Researchers at the Biodesign Institute of Arizona State University have developed a cost-effective and simple treatment process for a safe and environmentally responsible reuse of municipal sewage sludge and the valuable resources contained therein. This treatment process can be easily implemented in existing sludge treatment infrastructure to remove a significant fraction of IOCs from MSS prior to land application. This could help prevent contamination of soil and water resources and recover valuable constituents of solid suspensions for resource extraction.

This cost-effective and simple treatment process improves the quality of sludges destined for land application, and protects soil and water resources. It will also result in increased removal of regulated toxic metals, recovery of ionizable resources, and a decreased pathogen burden in sludges prior to disposal and environmental release.

Potential Applications

- Treatment of industrial sludges, including municipal sewage sludges
  - Removal of regulated toxic metals
  - Reduction in the leachable fraction of contaminants
  - Recovery of ionizable/valuable constituents
  - Decrease in pathogen burden
  - Prevention of contamination of soil and water resources

Benefits and Advantages

- Cost-effective and simple
- Can be easily implemented in existing sludge treatment systems
- Safe and environmentally responsible

- Reduces human health risks and improves the sustainability of sludge reuse
- Has the potential to reduce the burden of harmful ionic pollutants (e.g. antibiotics, endocrine disruptors etc.); projected to remove some 42 metric tonnes of organic pollutants annually from U.S. MSS at little added costs

For more information about the inventor(s) and their research, please see Dr. Halden's laboratory webpage