

Highly contaminated sediments from the Gowanus Canal Superfund site: Beneficial use as a fuel resource.

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Background/Objectives. The ca. 3 km long Gowanus Canal (Brooklyn, NY, USA) is an industrial waterway dating from 1869, on the Superfund list since 2010. Discharges of contaminants into the canal from a wide variety of sources (notably from manufactured gas plants) persisted for decades. In addition, input of raw sewage into this waterway began in the 19th century and continues nowadays whenever excessive storm water provokes combined sewer overflows. The chronically hazardous conditions present at the canal distress local residents and impede economic development in its vicinity. Proposed remedial measures remain controversial, elusive, and extraordinarily expensive. The objective of this study is a more complete characterization of the canal's contaminated sediments, employing tools of petroleum and coal geochemists not often applied to contamination problems. This has been done to encourage consideration of alternative remedial approaches.

Approach/Activities. We re-examined bulk and molecular data produced from hundreds of sediment samples documented in the 2011 US EPA Gowanus Canal Remedial Investigation Report*. In addition, on a representative suite of surface sediment samples, we undertook molecular analyses for coal tar, petroleum, and sewage marker compounds, and employed techniques commonly used for petroleum source rock analysis and coal characterization.

Results/Lessons Learned. Applying an environmental forensics approach to data in the EPA report*, we note systematic variations in polycyclic aromatic hydrocarbon (PAH) ring number distributions in the canal sediments. While the bulk of the PAHs likely are legacy contaminants from the former manufactured gas plants, there is also ongoing contamination by sewage and petroleum, the molecular markers of which we readily detected in a number of surface sediment samples using analytical pyrolysis. Proximate and ultimate analyses and Rock-Eval pyrolysis revealed the extraordinary organic richness of these sediments, suggesting that they should be considered a fuel resource for local electric power generation, as an alternative to their expensive disposal as hazardous waste. Given the sediment's sewage component, it could even be considered, in part, a biofuel.

* http://www.epa.gov/region02/superfund/npl/gowanus/ri_docs.html