CASE STUDY

Allied Microbiota Evaluates Process for Soil and Sediment Remediation of Contaminants

New York State Pollution Prevention Institute

Allied Microbiota

Founded in 2017 by Dr. Ray Sambrotto and Frana James from Columbia University, Allied Microbiota is supported by NYSERDA's PowerBridgeNY and Clean Energy Business Incubator Program at Stony Brook University. Allied Microbiota has developed methods of bioremediation using naturally isolated bacterial cultures and their enzymes for remediation of soil, sediments and groundwater using techniques like composting, and flow through reactors. Allied Microbiota claims their processes offer environmental and cost advantages as compared to treatments for recalcitrant remediation like incineration and landfilling, by destroying contamination like polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs).

Challenge

There are over 1,300 disposal sites on the National Priorities List (NPL) of the U.S Environmental Protection Agency and approximately 11 million people in the U.S., including 3-4 million children, that live within 1 mile of a federal Superfund site and confront significant health risks. Currently popular options for remediation of soils tend to be resource intensive and expensive, and require the permanent destruction and/or disposal of the contaminated soil. Allied Microbiota has developed a unique bioremediation solution for remediation of contaminated soils, using naturally isolated bacterial cultures and enzymes. Allied Microbiota claims to return soil to a usable state with fewer resources and lower cost.

Solutions

Allied Microbiota worked with the New York State Pollution Prevention Institute (NYSP2I) to assess, in terms of kg of carbon dioxide equivalents (kg CO2e), Allied Microbiota's remediation process as compared to a baseline process for remediating polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). NYSP2I researched

Challenge

- Allied Microbiota requested NYSP2I's assistance to evaluate their remediation process as compared to a baseline process for remediating polycyclic aromatic hydrocabons (PAHs) and polychlorinated biphenyls (PCBs).

Solution

- NYSP2I researched current processes for remediating PAHs and PCBs.
- NYSP2I calculated and compared GHG impacts of Allied Microbiota's remediation process and the selected baseline process.

Results

- Allied Microbiota's process is less impactful than landfilling up to approximately 18 days of process time.
- Optimizing process time will be integral for Allied Microbiota to maintain favorable GHG impacts as compared to the baseline process.
- Adding a 1/4 inch of insulation to the treatment container could reduce the energy usage of remediation process by approximately 60%.
- Transportation distance is often the highest contributor to overall life cycle impacts of ex-situ remediation techniques.

current processes for remediating PAHs and PCBs, defined a baseline process for comparison, defined an analysis boundary, collected input and output parameters for performing the analysis, and calculated greenhouse gas (GHG) impacts of the Allied Microbiota and baseline remediation process. The GHG impact of remediating soil with a baseline process was compared to a range of impacts from process scenarios associated with the Allied Microbiota process.

Results

The work performed by NYSP2I resulted in GHG impact comparison of Allied Microbiota's remediation process as compared to excavation and landfilling of PAH and/or PCB contaminated soils. One of the main takeaways was that optimizing the process time will be integral for Allied Microbiota to maintain favorable GHG impacts as compared to the baseline process. It was estimated that, assuming equivalent excavation and transportation impacts, the Allied Microbiota process would be less impactful than landfilling up to approximately 18 days of process time.

Another key takeaway is that impacts associated with transportation of soil are often times the largest contributors of the life cycle GHG impacts of ex-situ soil remediation techniques. In addition to this, it was found that the number of sites permitted to accept PCB and PAH contaminated soils is shrinking and there is only one location presently in New York State. Therefore, strategic location of the Allied Microbiota treatment site may be an opportunity. Lastly, insulating the treatment container itself is a third accessible opportunity for limiting GHG impacts for Allied Microbiota, as it was found that adding a 1/4 inch of insulation to the treatment container could reduce the energy usage of their remediation process by approximately 60%.

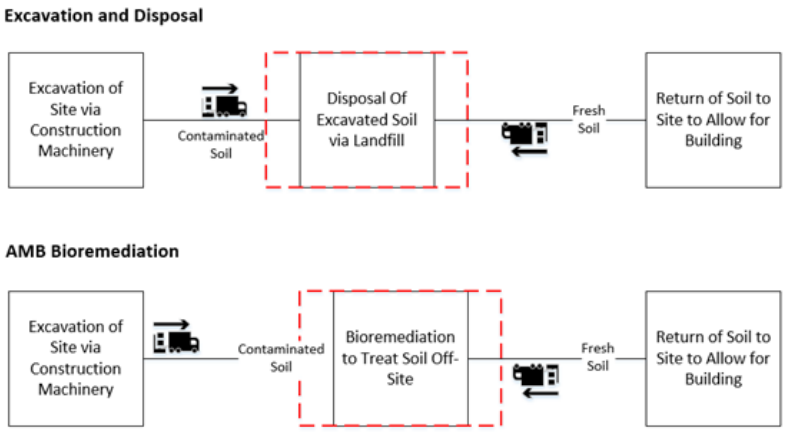

Figure: Analysis boundaries for AMB and baseline remediation processes

Allied Microbiota's future design plans include an insulated container, larger volume's of soil treated, and the development of an in-situ bioremediation process. While these elements were not considered as part of this analysis, they would all likely contribute to lowering the GHG impacts associated with Allied Microbiota's bioremediation process.

ALLIED MICROBIOTA

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