



Problem Summary & Decision Context

Task 2

- The Beneficial Use of Waste Materials Task is designed to conduct research and analyses to characterize and quantify the risks and benefits of using or reusing waste materials.
- There are 6 primary research areas in Task 2 that cover a broad spectrum of topics germane to the beneficial use of waste materials and address Agency, Office, Region and other client needs.

Six Sub-Task research areas

1. Materials Recovery Technology
2. Beneficial Use of Materials Optimization
3. Novel Products from Waste Materials
4. Land Application of Biosolids
5. Soil Remediation Amendments
6. Improved Leaching Methods for More Accurate Prediction of Environmental Release of Metals from Wastes

Utility of Task Outcomes

The products of this Task will enable communities and the Agency to better protect and enhance human health, well-being and the environment for current and future generations, through the reduction in material consumption, material reuse, and recycling of waste materials.



Carolyn Acheson



Souhail Al-Abed



Ronald Herrmann



Mark Johnson



Tao Li



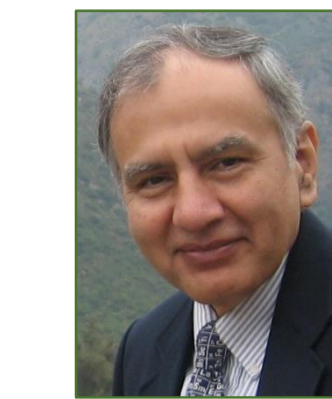
Susan Thornloe



Lee Vane



Sudhakar Takkellapati



Rajender Varma

Task/Sub-Task Overview

Sub-Task 1 – Dr. Lee Vane

Techniques for Separating Organic Solvents to Facilitate Reuse and Remanufacturing: The Remanufacturing Exclusion of the new definition of Solid Waste rule is intended, in part, to promote the reuse/re-processing of 18 industrial solvents in the pharmaceutical, paint and coating, plastic and resin, and basic organic chemicals sectors. The technical challenge to solvent reuse/reprocessing is that replacing virgin solvents with reclaimed material requires the application of separation technologies to recover those solvents from their mixtures with the other processing materials, such as water, and to purify the solvents to meet reuse specifications.

Sub-Task 2 – Dr. Souhail Al-Abed

Beneficial Use of Materials Optimization: The goal of this research is the development and validation of a Decision Support system that provides Regions, States, communities and the private sector with a quantitative database and tools to support better decision-making to optimize the beneficial use of waste materials.

Sub-Task 3 – Drs. Tao Li, Sudhakar Takkellapati and Rajender Varma

Novel Products from Waste Materials: A large amount of cellulosic, chitin and chitosan-based materials and protein-rich wastes are landfilled. A suitable and beneficial use for these wastes that not only decreases the burden on solid waste handling and pressure on landfill space, is to use them to create high value commercial products with multiple uses (e.g., creating a “bio-refinery”).

Sub-Task 4 – Drs. Carolyn Acheson and Ronald Herrmann

Land Application of Biosolids: In the US, municipal biosolids 60 % are land applied as an agricultural amendment and the remainder are incinerated or landfilled. This research investigates the persistence of organic compounds in land applied biosolids to determine if additional chemicals in biosolids should be regulated to be provide better protection of the environment and human health.

Sub-Task 5 – Dr. Mark G. Johnson

Soil Remediation Amendments: This research is focused on developing and testing biochar and other waste-derived materials as soil amendments to facilitate remediation of metals contaminated soils to support the establishment of a soil-stabilizing native plant cover for site remediation, revitalization and reuse.

Sub-Task 6 – Dr. Susan Thornloe

Next Generation Leaching Tests: The Leaching Environmental Assessment Framework (LEAF) is being used to develop a material-specific source term to determine constituent partitioning between liquid and solid phases for use in fate and transport modeling. LEAF is designed to identify characteristic leaching behaviors for a wide range of materials and associated use and disposal scenarios.

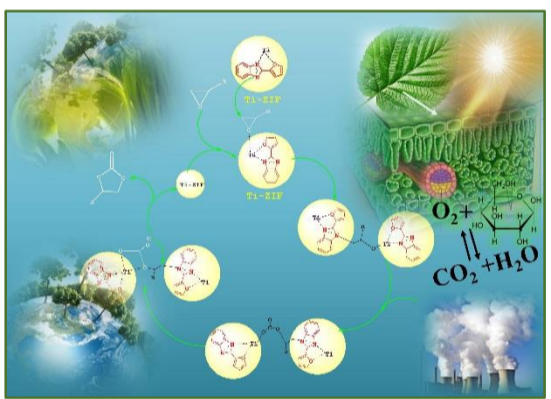
Accomplishments

Sub-Task 1: Biofuels research resulted in 4 patents, including 3 joint patents and license agreement with membrane technology CRADA partner.

Sub-Task 2 - FY16 Product: Report - Beneficial use of materials optimization

- Includes mathematical optimization algorithms to assist beneficial use decision-making process by determining the optimal allocation of materials, among competing beneficial use options to minimize the cumulative environmental impact across relevant media and to take into account costs, and social impact.

Sub-Task 3: Research article “Titanium-based zeolitic imidazolate framework for chemical fixation of carbon dioxide” featured on the cover of “Green Chemistry”



Sub-Task 4: Second field study completed and data analysis is underway.

Sub-Task 5: Collaborative studies with Regions 7 (Kansas City) and 10 (Seattle) on using soil amendments on mining impacted soils have been established.

Sub-Task 6: FY16 Product How to Guide for LEAF Implementation

- Provides information for users to illustrate how to select LEAF methods, identify site-specific datasets, and use LEAF results to develop site- and material-specific source terms. Guidance includes three case studies illustrating how to develop source term for (1) reuse of coal fly ash as a fill material; (2) evaluating contaminated soil for remediation; and (3) evaluating leaching from a stabilized waste under changing conditions.
- ORD completed this project but continues to support OLEM as they address comments from public and internal reviews.

Future Directions

- The research in all Sub-Tasks is well underway and continuing on their planned trajectories
- Task PIs maintain good communication with Offices, Regions and other clients/research end-users and adapt their research as needed
- Major products are scheduled for FY17, FY18 & FY19