Sludge/Biosolids Reuse

汚泥／バイオソリッドの再利用

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Sludge/Biosolids Reuse

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Biosolids Issues in the United States

- Land Application
  - Pathogen issues
  - Odor issues
  - Heavy Metals
  - Nutrients
  - Toxins
  - costs
- Incineration
  - Public opposition
  - costs
- Landfilling
  - Acceptable but will that continue?
  - costs

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Land Application

- Questions
  - Does anaerobic digestion provide protection?
    - If not, what is needed?
      - Modified digestion?
      - Other stabilization techniques?
  - Does pathogen reactivation occur in centrifuges?
    - If so, what does this tell us about digestion practices?
    - Should we use alternative dewatering methods?
    - Is it related to thermophilic anaerobic digestion?

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Land Application

- Questions
  - Are our current regulations protective of human health?
  - Can we overcome the problem of public perception that land application is inappropriate?
  - Can we develop processes to reduce or eliminate odor?
  - Can we reduce the costs of processing and transportation?

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Does Land Application Lead to Stream Pollution?

- Phosphorus in biosolids – is it too much?
- Do contaminants move off site? Under what conditions?
- Do pathogens move off site? Under what conditions?
- What is the fate of estrogenic compounds and other pharmaceuticals?

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Can we improve dewatering?

- Dewatering impacts all ultimate disposal costs
  - Cost of polymer or other conditioning agents
  - Less volume (drier cakes) result in lower hauling costs and more effective incineration and drying
  - Dewatering can generate odors, resulting in the need for more costly alternative disposal sites of eliminating land application

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WERF Research in Biosolids

In-plant processes that may affect sludge characteristics or mass

- Membrane Bioreactors for Anaerobic Treatment of Conventional and Medium Strength Wastewater (02-CTS-4)

  Develop and Demonstrate Fundamental Basis for Selectors to Improve Activated Sludge Settleability (01-CTS-4)
- Effects of Solids Properties on Membrane Bioreactors and Solids Processing 01-CTS-19UR)

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WERF Research in Biosolids

Processes to improve the quality or acceptability of biosolids

- Enhanced Digestion for Biosolids Odor Removal (Phase 3 of original Project 00-HHE-5) (03-CTS-9)

Fate of EDCs in Biosolids During Stabilization and Dewatering (04-HHE-?)

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WERF Research in Biosolids

Processes to improve biosolids, especially dewatering

- Mechanisms of Conditioning, Thickening and Dewatering (01-CTS-1)

A New Tool for Measuring Biosolids Floc Strength (01-CTS-32-ET)

Innovative Technologies To Reduce Water Content of Dewatered Sludges (02-CTS-3)

- Optimizing Thickening and Dewatering Operations Through Automation (98-REM-3)

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WERF research in Biosolids

Evaluation of Potential health Effects

- Evaluate Risks and Benefits of Soil Amendments Used in Agriculture(99-PUM-1)
- A Safety Assessment Tool for Land Application of Biosolids (00-PUM-6)
- Assessing the Fate of Emerging Pathogens in Biosolids (01-HHE-3)
- Quantification of Airborne Biological Contaminants From Land Application of Biosolids (02-PUM-1)

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Assessment of technologies

- Minimizing Biomass Production from Biological Treatment (00-CTS-10)
- Biosolids Management: Assessment of Innovative Processes (96-REM-1)

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Special concerns-Regrowth or reactivation of pathogens & indicator organisms

- Reactivation and/or Growth of Indicator and Pathogenic Bacteria During Centrifugal Dewatering of Anaerobically Digested Sludge (02-CTS-2)
- Examination of Reactivation of Fecal Coliforms in Anaerobically Digested Biosolids (03-CTS-13)

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The Biosolids Summit

- Purpose – Bring together a wide variety of stakeholders to address questions about the land application of treated sewage sludge and to develop a multi-year research agenda that included public input.
- *Stakeholders are those, including the public, that have an interest in or may be impacted by biosolids disposal practices*

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Top 6 projects recommended from the biosolids summit

- Rapid incident response study (outbreaks, case control study, etc.)
- Targeted characterization of pathogens in sludge and biosolids
- National survey of constituents of concern
- Characterization of bioaerosols associated with land application
- Characterize the odor compounds emitted from sludge through the entire process
- Cost/benefit analysis for use and disposal of sludge/biosolids

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Topics and Interest

participants	I-9	N-20	A-21	R-9	U-11
Pathogens	22%	10%	14%	22%	9%
Human Health	22%	40%	9%	44%	27%
Treatment, odor, Mgt.	44%	10%	29%	11%	36%
Econ, social, pol.	11%	20%	5%	0	9%
Fate & transport	0	10%	24%	22%	9%
Risk Assess	0	10%	19%	0	9%

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I is industry, N is non trad, A is academic, R is regulator, U is utility

Summary

- Interest in human health – fate of pathogens and processes to destroy them
- Much less interest in chemicals except for EDCs and other pharmaceuticals
- Interest in odors
- Interest in better dewatering

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