ALKALYE DIGESTERS, HYDROLYSATE, AND TSE

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NACWA PRETREATMENT CONFERENCE
Decommissioned Animal Incinerator at the Cornell College of Veterinary Medicine
Prions (pree-ons) are self-replicating, misfolded proteins that are widely believed to be the cause of transmissible spongiform encephalopathies (TSEs). TSE is a family of rare progressive neurodegenerative disorders that affect both humans and animals.

- **Animals**
  - **Cow**
    - Bovine Spongiform Encephalopathy (BSE)
      - commonly called, “Mad Cow Disease”
  - **Deer**
    - Chronic Wasting Disease (CWD)
  - **Sheep**
    - Scrapie
    - Transmissible mink encephalopathy
    - Feline spongiform encephalopathy
    - Ungulate spongiform encephalopathy

- **Humans**
  - Creutzfeldt-Jakob Disease (CJD)
  - Gerstmann-Sträussler-Scheinker Syndrome (GSS)
  - Fatal Familial Insomnia
  - Kuru
Prions (PREE-ons) were named in 1982 by their discover, Nobel laureate Dr. Stanley B. Prusiner. His memoir of the discovery, *Madness and Memory*, was published in May of 2014 by Yale University Press.
Two years of meetings led to selection of alkaline hydrolysis to replace incineration at CCVM. The committee included local residents opposed to upgrading the incinerator.
Bench Top Experiment to Determine if Hydrolysate is Compatible with the IAWWTF Digester
CCVM's Digester Vessel in the Factory

This is a pressurized unit that operates at high temperature
CCVM Digester Installed
The Digester

- KOH, water, and heat
- 300F, 90psi, 6 hrs

- 5,000lb of carcass (max capacity) results in 3,500 gal effluent

2061 lbs
131 lbs
Biological Challenge Testing
Every batch is certified digested.
Digestion is more energy efficient than incineration.

91% less natural gas used to treat 23% more waste

Last full year of incinerator operation:
July 2008 - June 2009
339,960 pounds waste
184,345 therms natural gas

Digester testing and transition between incinerator and digester:
July 2009 - April 2010

First full year of digester operation:
May 2010 - April 2011
416,923 pounds waste
17,043 therms natural gas
Hydrolysate being loaded for delivery to the IAWWTF, where it is slowly fed to the anaerobic digester.
Highest readings occurred when the amount of tank rinse water was accidently reduced. Average, excluding 5 wks of high #'s =

COD = 81,425  
BOD \((\text{COD} \times 0.56)\) = 45,601
Feed to the IAWWTF Digester

Estimated yield of biogas in cubic feet per day

- Treatment Process Residuals
  (14,000 pounds of volatile solids per day) = 100,000

- Trucked Waste Substrates of note:
  CCVM Digester Hydrolysate = 30,000
  Greek yogurt whey = 8,000
  Septage = 50,000
  Grease = ?

Total Cubic Feet of Biogas / Day (approx.) 200,000
Codigestion of Hydrolysate Increases Biogas Production = $
Bio-Response Solutions, Inc.

These units operate at lower temperatures, for longer durations, at atmospheric pressure.
Portable Low-Temp Unit; Residual from a 2200 lb. load; multiple animals. 2008 test conducted in Maryland for regulators.
Using EPA 1664, hydrolysate tests very high in FOG. However, it is highly miscible and does not cause blockages. If your local limits include a fixed numerical limit for FOG, consider changing to a BMP based requirement.

Will cemeteries soon be watered with dilute hydrolysate?
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