

# Disposal, Cleaning and Disinfection

*for*

## Animal Disease Outbreak Response

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Protecting Animal Agriculture



# OIE Terrestrial Animal Code

Article 8.5.9: Recovery of free status after FMD Outbreak

Stamping Out Without vaccination:

3 months after the last case where a *stamping-out policy* and serological *surveillance* are applied ...

No Stamping Out With Vaccination:

18 months after the last case where a *stamping-out policy* is **not** applied, but emergency vaccination and serological *surveillance* ... are applied...

## Animal Health Protection Act –

Delegates APHIS the authority to regulate animal health activities



# APHIS Regulations

## Title 9 CFR: Animals and Animal Products

### PART 53— FOOT-AND-MOUTH DISEASE, PLEUROPNEUMONIA, RINDERPEST, AND CERTAIN OTHER COMMUNICABLE DISEASES OF LIVESTOCK OR POULTRY

#### § 53.4 Destruction of animals.

(a) Except as provided in paragraph (b) of this section, **animals infected with or exposed to disease shall be killed promptly after appraisal and disposed of by burial or burning**, unless otherwise specifically provided by the Administrator, at his or her discretion.

#### Subchapter B-Cooperative Control and Eradication of Livestock or Poultry Diseases

- Cleaning and Disinfection of premises as approved by APHIS
- Producer responsible for cost of cleaning and disinfecting premises
- APHIS typically pays indemnity for animals ordered destroyed



United Kingdom, Japan, South Korea

# LESSONS LEARNED FROM OTHER COUNTRIES



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# 2001 UK FMD Outbreak





# 2010 Japan FMD Outbreak – Lack of Burial Sites Slowed Response



# South Korea Experience – Massive Environmental Impacts



Quarantine workers yesterday pour disinfectant into waste pumped up from a culled animal burial site in Namyangju, Gyeonggi. In the first test, animal blood was discovered. [YONHAP] Feb 22

.... “Measures to prevent water pollution are urgently needed, such as installing blocking walls inside the disposal sites or using pumps to remove the waste,” Cho said. Cho also urged local governments to build incinerators to burn animal remains instead of burying them. ...

# APPLYING TRADITIONAL STRATEGY IN US



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# Logistics



Typical Feedlot– Nebraska

Assume 50,000 head at 1200 lbs each =

60 M lbs = 30,000 tons

Commonly-available dump truck can hold 20 tons...



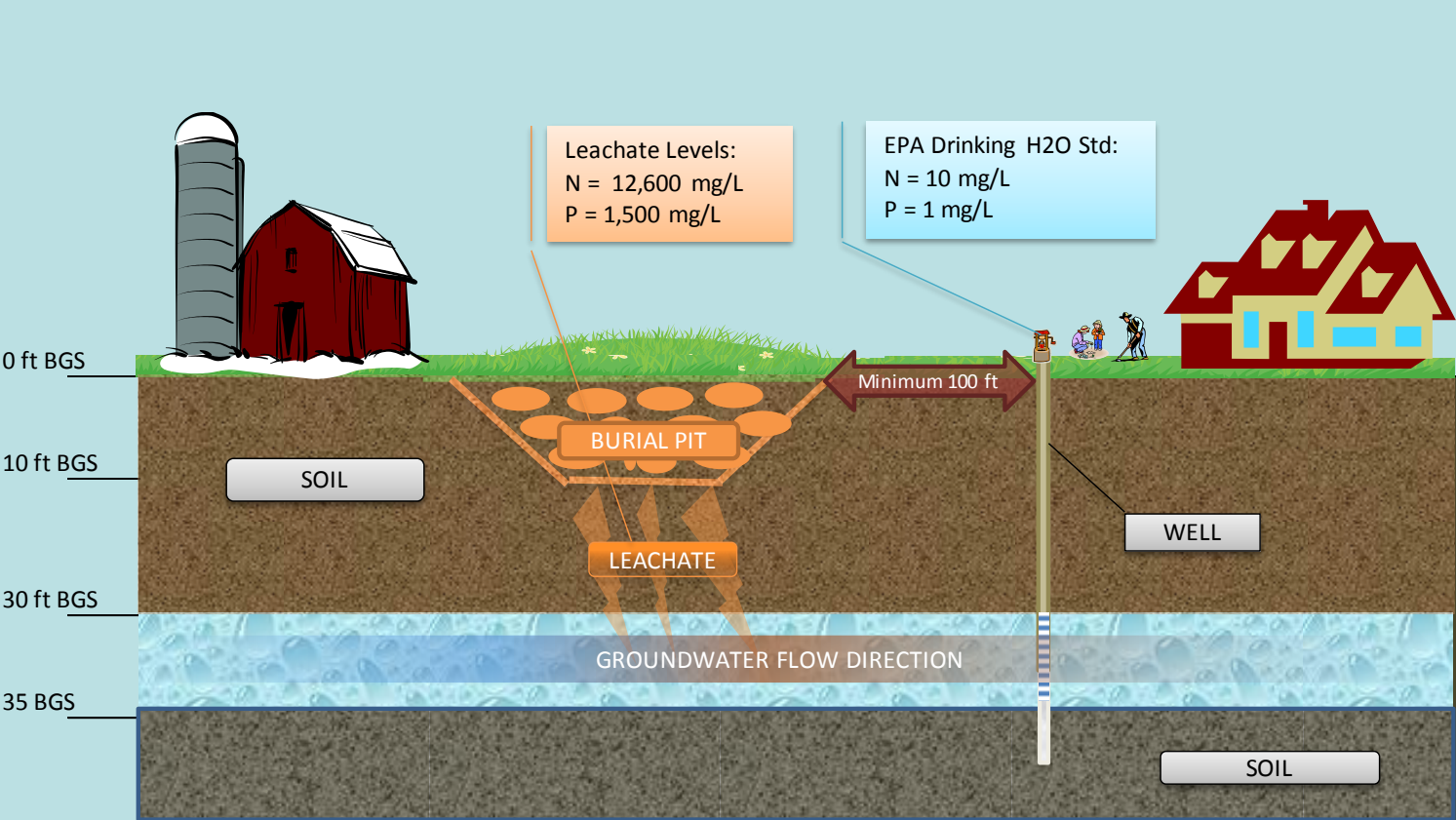
- It would take at least 1500 loads to move animals from pens to disposal site.
- If you can load and decon 2 trucks per hour, it would take 750 hours or more than a month working around the clock.

# Cattle Burial

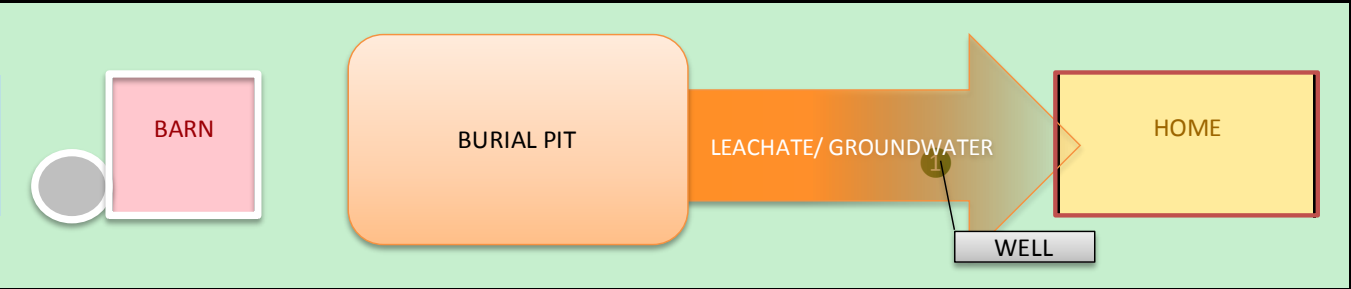
- 50,000 head cattle
- 50,000 head x 8 ft length = 400,000 ft = 76 mile trench length
- Area = 76 miles x (4+3) ft = 64 acres\*
- 2400 gallons per day of leachate (assuming 60M lbs biomass with 60% rapidly degradable = 600K lbs leachate at 8.34 lbs/gallon over 5 years)

\* Note: Actual land area required by Japan for FMD mortality burial in 2010 was approximately twice this estimate because of the need for a buffer zone around trenches.

# Burial Effect on Environment



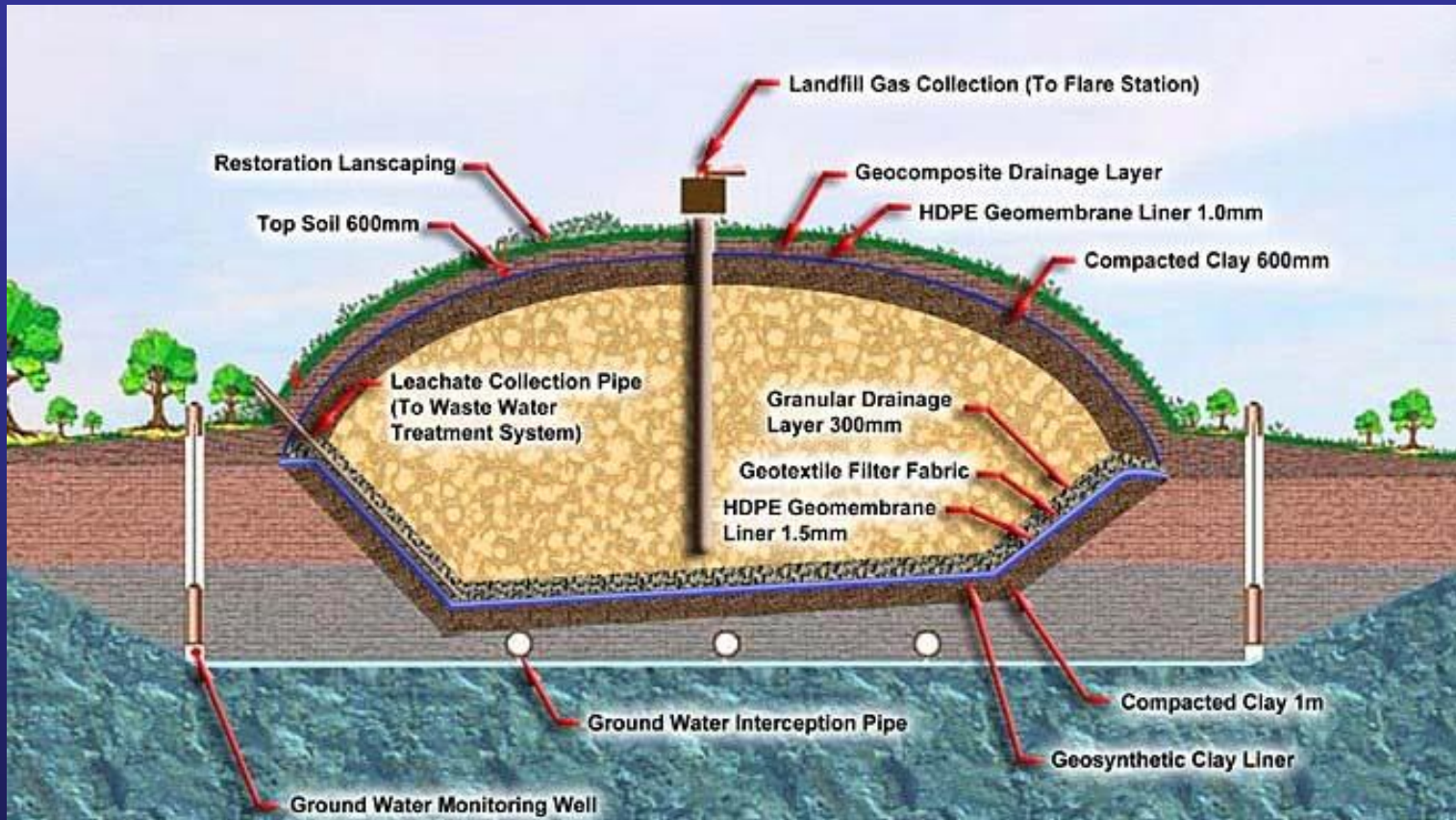
Property values? Clean-Up Liability?



# Why is nitrogen a problem?

- EPA standard for nitrates in drinking water is 10.0 mg/L
- Carcass burial sites generate over 1000 times the standard
- Causes Methemoglobinemia (blue baby syndrome) which can be fatal to infants
- Toxic to aquatic life
- Depletes dissolved oxygen in receiving waters
- Stimulates aquatic plant growth (eutrophication)

# Safer Burial Pit = Permitted Landfill



Use existing landfill capacity or build for purpose (would take at least 6 months to design/build)

# IMPROVED STRATEGIES



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# Disposal Matrix

Weighting	Criteria	Off-Site Landfill	Rendering	Off-Site Incineration	Composting	Open Air Burning	On-Site Burial
Most Important (x3)	Public Health Risk (1)	9	9	9	9	6	3
	Biosecurity (2)	6	6	6	3	3	3
	Pathogen Inactivation (3)	3	6	9	6	9	3
	Environmentally Sustainable (4)	9	9	9	9	3	3
Important (x2)	Need to Transport Carcasses Offsite (5)	2	2	2	6	6	6
	Volume Reduction (6)	4	6	6	4	6	4
	Availability(7)	6	4	2	4	4	4
	Throughput (8)	6	6	2	4	4	4
	Speed to Implement (9)	6	4	4	4	4	4
	Public Acceptance (10)	6	4	6	4	2	4
Less Important (x1)	Cost Effectiveness (11)	3	2	1	1	1	3
	Efficiency (12)	3	3	3	2	1	2
	Operability (13)	3	3	3	2	1	3
	Regulatory limitations (14)	2	3	2	2	1	1
	Denial of use (15)	3	2	2	2	2	1
	<b>Total Points</b>	71	69	66	62	53	48
	<b>Average Score</b>	4.7	4.6	4.4	4.1	3.5	3.2

# Decision Loop



# Checklist

## First Option - Can Animal be used for its intended purpose?

- Consider vaccination as a way to maintain animal health
  - Consult USDA APHIS Red Book for guidance on stamping out, vaccination to live and vaccination to slaughter options
- Can livestock and poultry entering the food chain meet food safety requirements? Consult with food safety officials to:
  - Ensure animals are safe for human consumption
  - Ensure public acceptance of products
  - Ensure pathogens are contained

# Checklist

- If so, send to slaughter or other processing. **If not**, ensure that depopulation methods are compatible with disposal capacity. Consider storage options so depopulation rate does not exceed disposal rate.
- Proceed through checklist to select disposal option(s).**

# Checklist

- **Second Option - Can off-site permitted landfill be used?**

- See a comprehensive list of landfills at

- <http://www2.ergweb.com/bdrtool/login.asp>.

- Logon to the I-WASTE Tool and obtain a password if you do not currently have one.

- Enter userid and password.

- Choose treatment and disposal facilities button on the lower left.

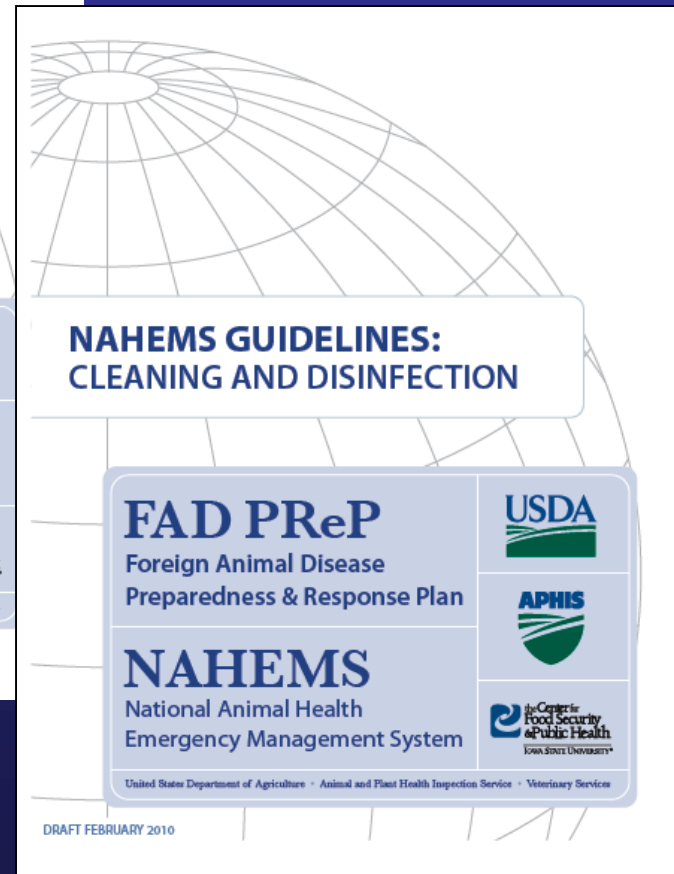
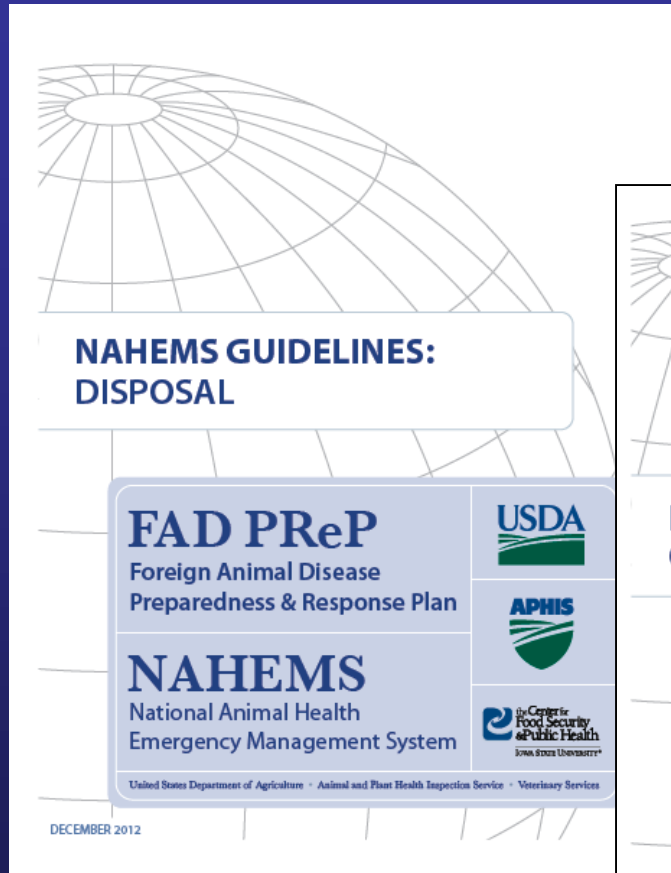
- Enter filter criteria such as “facility type (e.g., rendering, incinerators, or landfill)”

# Checklist

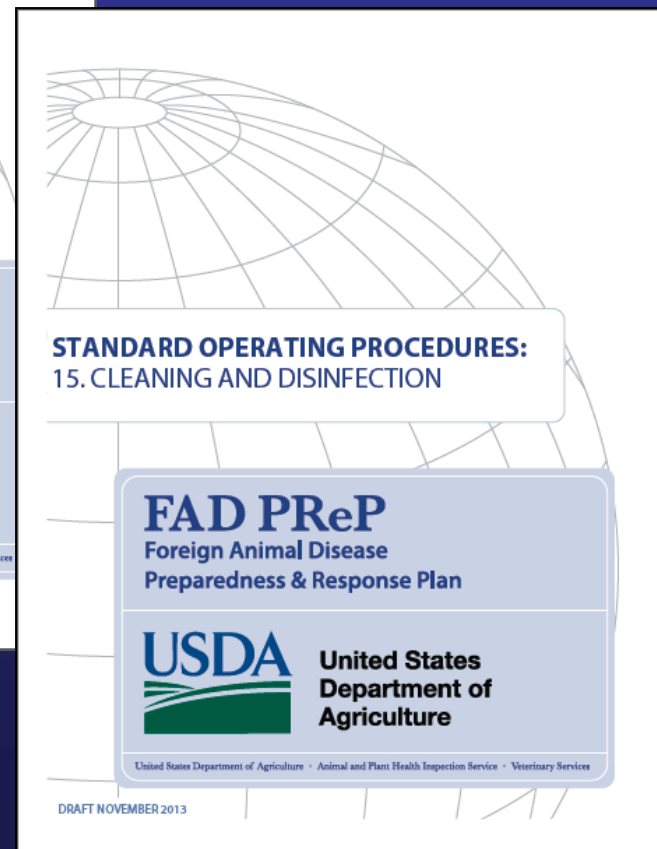
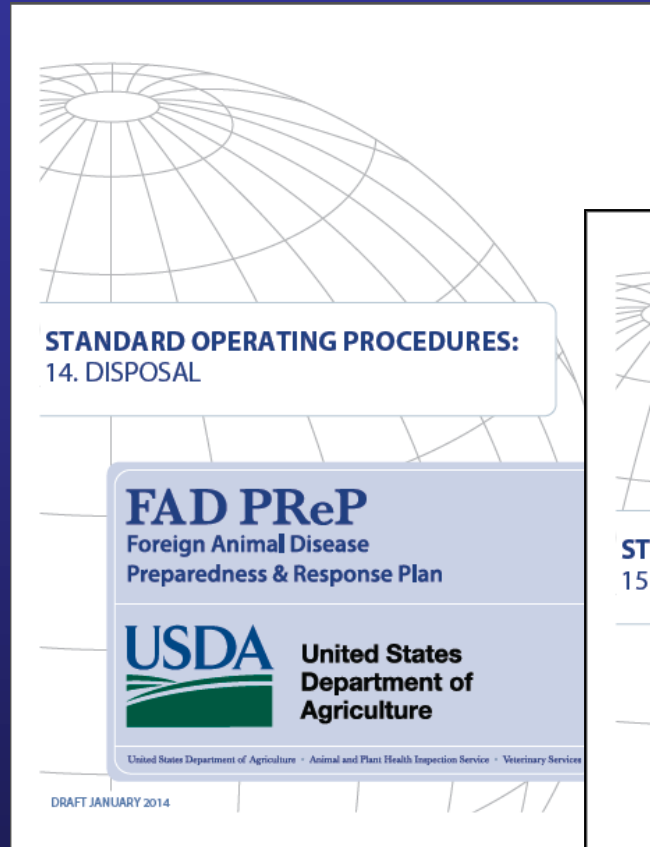
- Note that construction debris landfills are not suitable for carcass disposal, and hazardous waste landfills are not necessary unless the carcasses are contaminated with a hazardous material causing them to be classified as hazardous
- Enter State or EPA region, and click “View List of Facilities” button.
- Contact facilities and determine if they will accept your livestock or poultry and meet some or all of your capacity needs.



# FAD PReP Guidance Documents



# FAD PReP SOPs



# Online Training: APHIS website

http://www.aphis.usda.gov/ - Animal Disease Outbreak Emergency Management Tools : Animal Di...

USDA APHIS Animal Disease Outbreak Emergency Management Tools

Emergency Management Tools 3 of 9

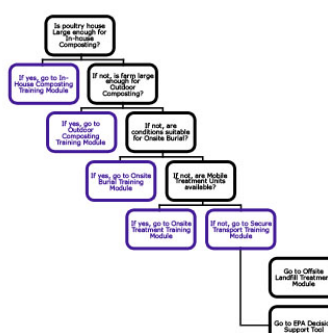
## HPAI Disposal Tools

The [Disposal Options Decision Tree](#) page consists of a series of training modules to assist with the carcass disposal decision-making process. Users can access training for the following subjects:

- In-House Composting
- Outdoor Composting
- Onsite Burial/Treatment
- Secure Transport
- Offsite Landfill/Treatment
- Cleaning and Disinfection

Each box links to a list of decision criteria, a training module on the selected action, or a link to additional information/resources.

You can also access [EPA's Suite of Disaster Debris Management and Disposal Decision Support Tools](#) and other useful documents from this page.



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graph TD; A[Is poultry house large enough for In-House Composting?] --> B[If yes, go to In-House Composting Training Module]; A --> C[If not, is large enough for Outdoor Composting?]; C --> D[If yes, go to Outdoor Composting Training Module]; C --> E[If not, are conditions suitable for Onsite Burial?]; E --> F[If yes, go to Onsite Burial Training Module]; E --> G[If not, are Mobile Treatment Units available?]; G --> H[If yes, go to Onsite Treatment Training Module]; G --> I[If not, go to Secure Transport Training Module]; I --> J[Go to Offsite Landfill Treatment Module]; I --> K[Go to EPA Decision Support Tool];
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Select the image above to see a full-size version.

USDA APHIS Cleaning and Disinfection


Cleaning and Disinfection Introduction 1 of 6

## Introduction

Welcome to the Cleaning and Disinfection Course.

The purpose of this training course is to provide emergency responders the information to react to an animal disease emergency while preventing spread of the disease. This is one in a series of several courses which address disposal methods for animal disease mortalities. This course focuses on cleaning and disinfection of the premises after mortalities have been removed, in order to enable the facility to be repopulated.

This course covers personal protective equipment (PPE) requirements; roles and responsibilities of the C&D Unit; biosecurity protocols; and cleaning and disinfection methods, procedures, and agents utilized for animal houses, equipment and vehicles.



# UNANSWERED QUESTIONS



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# Disposal Technology Risk Assessment

Exposure assessment for livestock carcass disposal options

EPA's National Homeland Security Research Center

The main objectives are to determine:

- Hazards associated with livestock carcass disposal options following a natural disaster, Foreign Animal Disease (FAD) outbreak, or other potential cause for massive carcass disposal of livestock
- Exposure pathways associated with each identified carcass disposal option
- Calculated exposures for each exposure pathway with sufficient data to quantify
- Levels of uncertainty in the calculated exposures
- Carcass disposal options that are the least likely to result in exposure impacts to additional livestock, human health, and/or the environment
- Knowledge gaps for further study to help minimize uncertainties in the assessment

Carcass Disposal Options Processes

Rendering	Load animal into truck	Cover truck	decon outside of truck	transport to rendering	unload truck	grind carcasses	cook	manage steam, tallow, and meal	Human, Ecological, and Livestock Health Risks
Sanitary Landfill				transport to landfill		bury carcasses	manage leachate, landfill gas, and solids		
Permitted Incinerator				transport to incinerator		load animals into incinerator	process	manage air emissions and ash	
Composting				transport to compost area		build windrows	manage finished compost		
Open Burning				transport to burn site		burn carcasses	manage leachate, ash, and smoke		
Unlined Burial				transport to burial site		bury carcasses	manage methane and leachate		

# Rendering Plant Risk

4<sup>th</sup> International Symposium on  
Managing Animal Mortality, Products,  
By Products and Associated Health Risk

Dearborn, MI

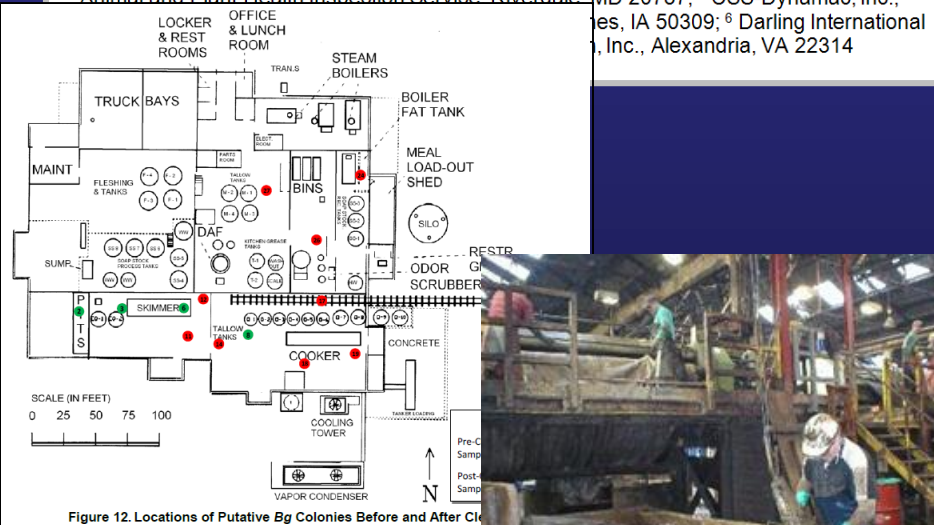
May 21-24, 2012

## Field Study to Examine Restoration of a Rendering Facility Back to Normal Operation Following Its Use for Disposal Rendering in an FAD Response

Paul Lemieux<sup>1</sup>, Associate Division Director, NHSRC/DCMD (lemieux.paul@epa.gov)

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## Findings/Recommendations:

Routine plant cleaning procedures resulted in approximately 1-log reduction in pathogen loading

The cleaning process using the steam and hot water has the potential to spread the contaminant throughout the plant

Establish contaminant control procedures for plant workers prior to delivery of any contaminated materials to the plant



# Safe Transport Standards

## Logistical Infrastructure Study

USDA APHIS

North Carolina Department of Agriculture and Consumer Services

West Texas A&M University

University of Minnesota

Negligible Risk



Low Risk



Moderate Risk



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# Waste Pretreatment Study

Pretreatment Feasibility Study

EPA's National Homeland  
Security Research Center



# Transportable Gasifier

## Transportable Gasifier for Animal Carcasses: Emission Test Results

**Paul Lemieux, PhD**

U.S. EPA

**David Brookes**

BGP, Inc.

**Jim Howard**

North Carolina

**John McKinne**

## Thermodynamic and Design Concepts Behind the Transportable Bio-Mass Gasifier

David Brookes, P.Eng.



Written for presentation at the  
**Symposium: Management of Animal Carcasses, Tissue  
and Related Byproducts  
Protecting Research, Regulations and Response  
University of California at Davis  
Davis California  
July 21-23 2009**

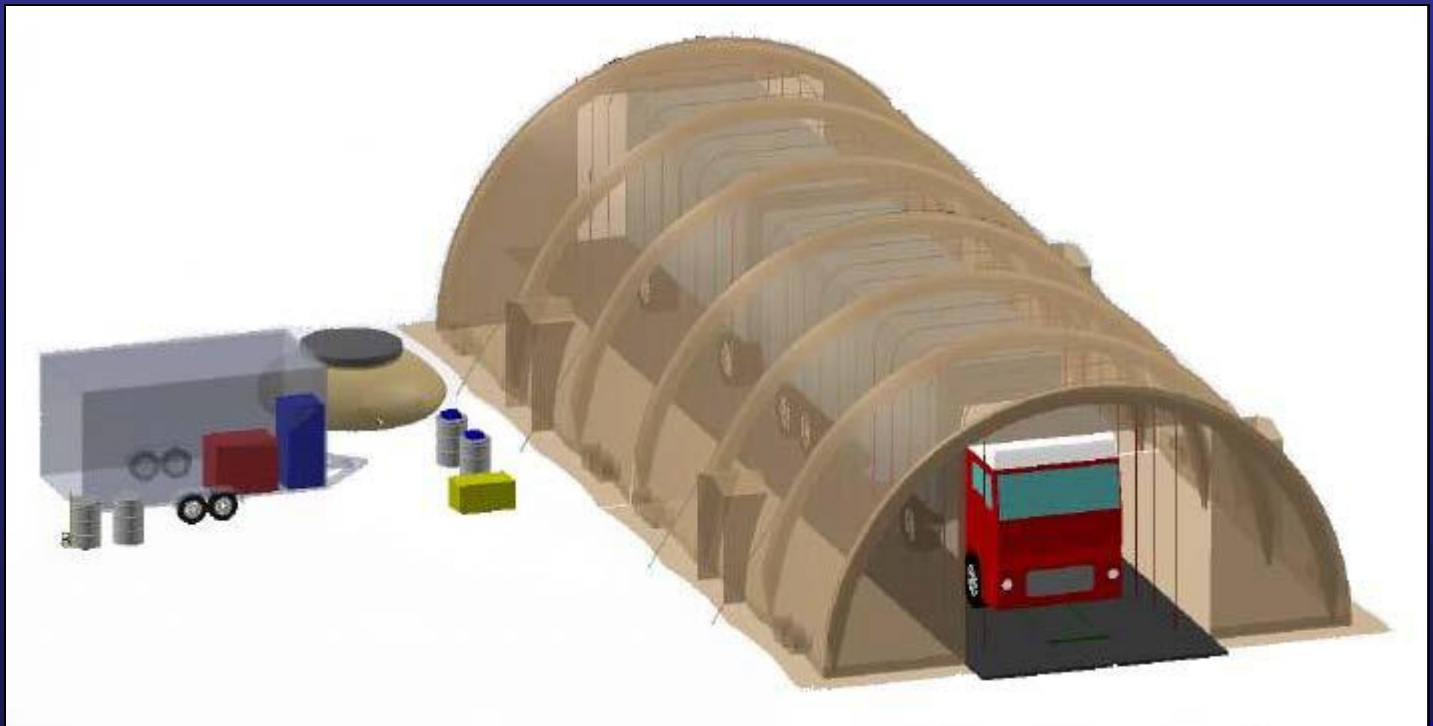
Thermodynamic precepts that are used in the design of all Brookes gasification systems and to some degree these are discussed in US Patent No. 6,116,168. The Transportable Gasifier is a dual chamber system that is intended to be capable of disposing of relatively high volumes of bio-mass in an efficient and environmentally safe




# Automated Vehicle Decon

Non-Freezing Portable Vehicle Wash  
Tunnel

Integrated Solutions for Systems  
Huntsville, Alabama




# Agent Persistence Data

 EPA  
United States  
Environmental Protection  
Agency

EPA 600/R-11/092 | September 2011 | www.epa.gov/ord

**Effectiveness of Physical and Chemical Cleaning and Disinfection Methods for Removing, Reducing or Inactivating Agricultural Biological Threat Agents**



Office of Research and Development  
National Homeland Security Research Center

- Viable *Bacillus atrophaeus* detected in aerosol from pressure sprayer
- Viable *Bacillus atrophaeus* detected in disinfectant rinsate
- Suggests low-pressure sprayers, aerosol containment, and rinsate collection are required when decontaminating bacillus-contaminated environments
- Follow-on study examining viruses and soiled surfaces

# SUCCESSFUL RESPONSE



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# LPAI in Quail New York, 2007



# Situation



Quail carcasses in bags

Poorly managed operation





# Situation – Years without maintenance



# Preparation





# Sorting and Piling



# Shoveling



# Containerizing





# Dust and Particulates



# Dry Cleaning – Broom Clean



# Washing, Rinsing, Disinfecting





# Drying, Contact Time



# Ancillary Equipment Disinfection





# Collecting Effluent



# Demobilizing





# Transporting



# Transporting



# Questions

