Post-Closure Care of Solid Waste Landfills

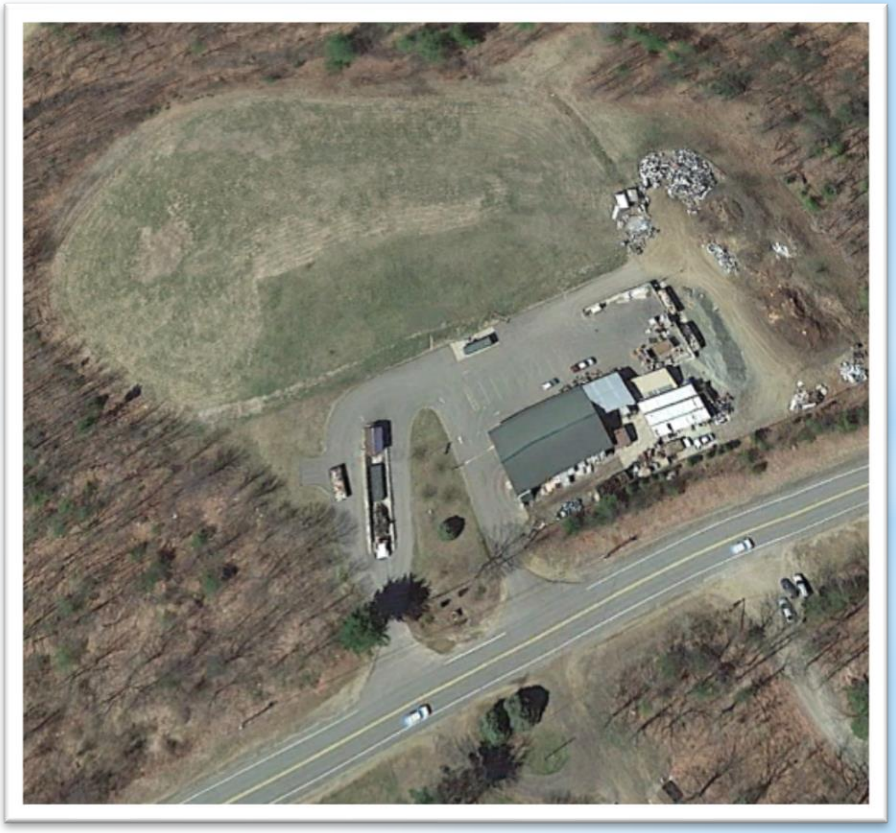
LRPC Round Table
May 30, 2019

Solid Waste Management Bureau
New Hampshire Department of Environmental Services

OBJECTIVE

To answer 2 questions:

- Why does my closed landfill still matter?
- How do I take care of it?



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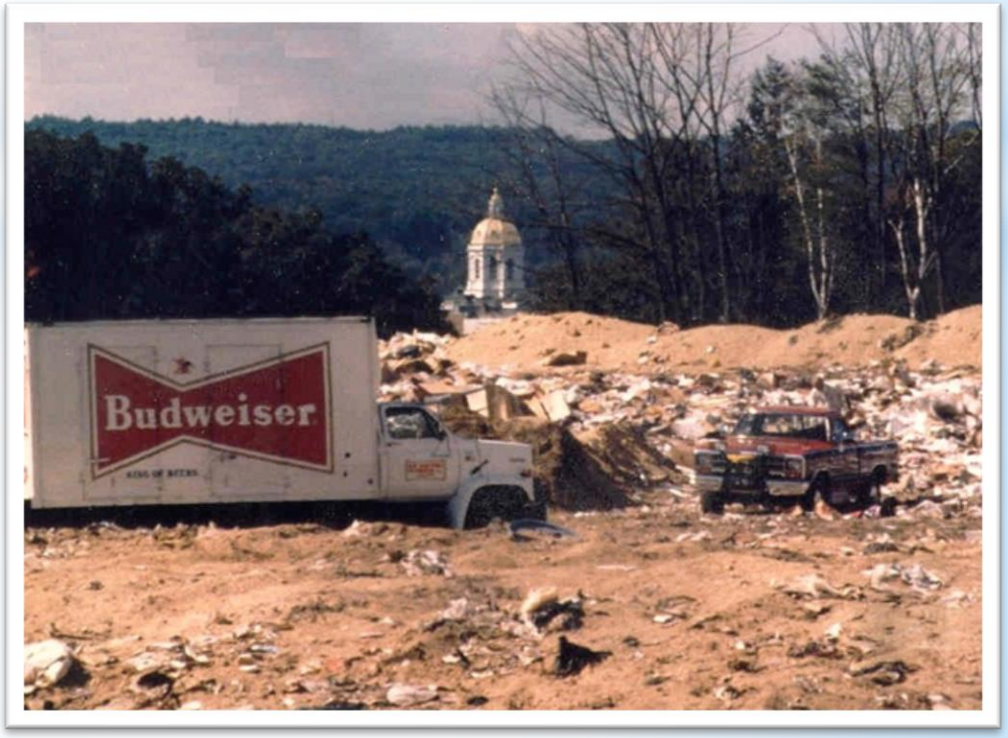
Presentation Overview

- Brief History & Design
- Post-Closure Inspection, Maintenance & Monitoring
- Post-Closure Reporting
- Questions



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Brief History of "The Dump"

Pre-1960s

- Open Dumps
- Burn Dumps

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Brief History of "The Dump"

Federal legislation in 1960s-70s

- Clean Air Act
- Solid Waste Act

New Hampshire changes

- 1969-1972 NH Solid Waste Laws & Regulations
- 1981 Solid Waste Management Act
  (currently RSA 149-M)

History: Closing "The Dump"

Late 1980s - State made it a priority to close unlined solid waste landfills

1994 - NH Legislature established the Grant Program

"In recognition of the potential for harm to both public health and the environment which can result from an unlined solid waste landfill that has not been properly closed… it is hereby declared to be the policy of this state to encourage municipalities to close all unlined solid waste landfills…" ~RSA 149-M:41

History: Closed Landfills

1990s – Majority of unlined solid waste landfills closed

2013 - Last unlined municipal solid waste landfill closed

Today – Approximately 300 closed landfills in NH

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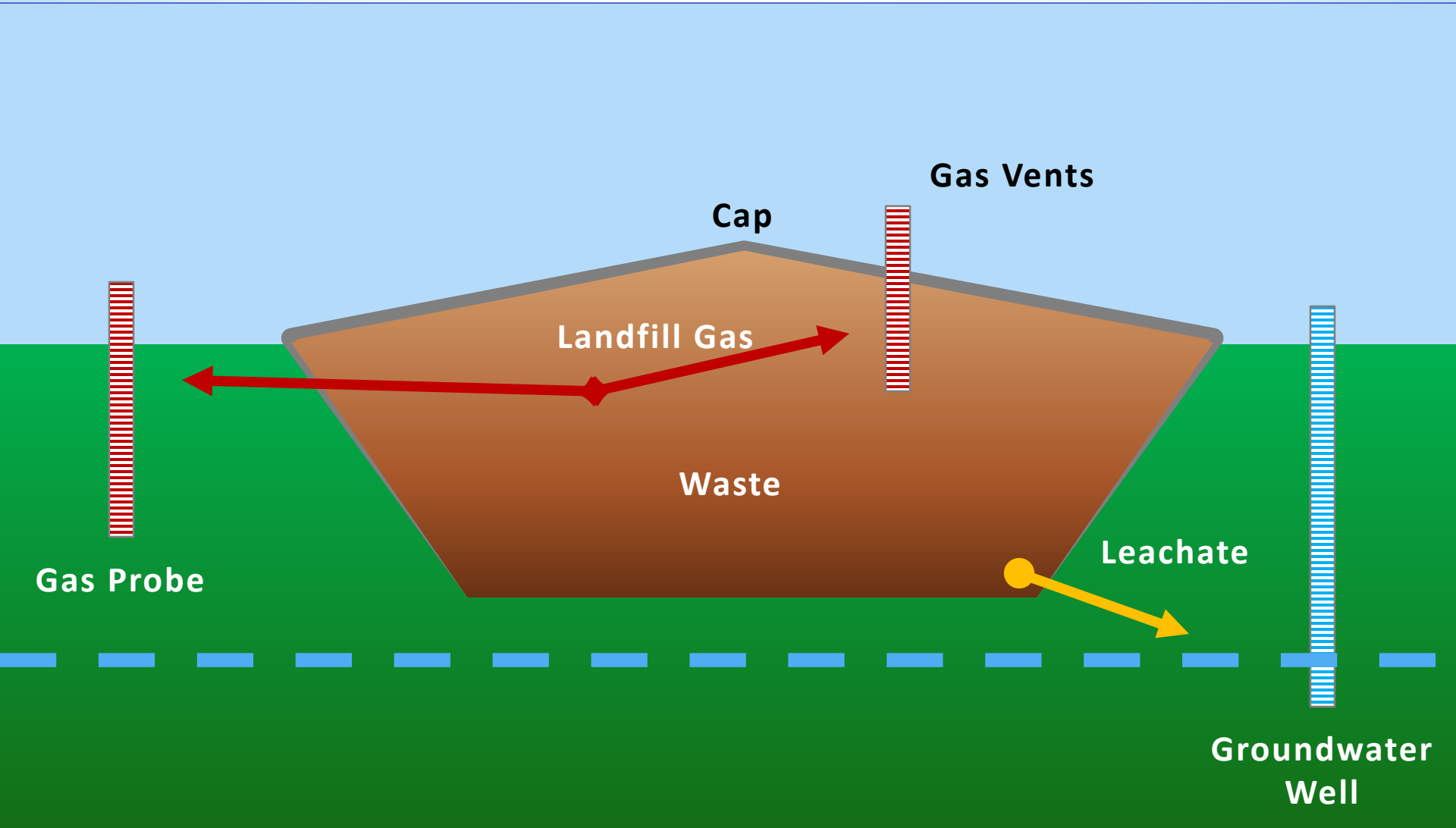
Basic Design: Unlined Landfill



Why Does My Closed Landfill Still Matter?

- Landfills are a containment system for waste.
  - Unlined landfills rely on the cap.
- Waste is a mix of discarded or abandoned household, business, mining, agricultural, and industrial materials.
- Without periodic inspection, monitoring, and routine maintenance, we can not assume these containment systems (i.e., the cap) will continue to function adequately forever.

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Why Does My Closed Landfill Still Matter?

Poorly maintained containment systems can leak, leach, breach…

Negatively impacting water, soil, and air quality.

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Why Does My Closed Landfill Still Matter?

- Protect your investment
- A little now saves big later
- Reduce potential liability

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How Do I Take Care of My Closed Landfill?

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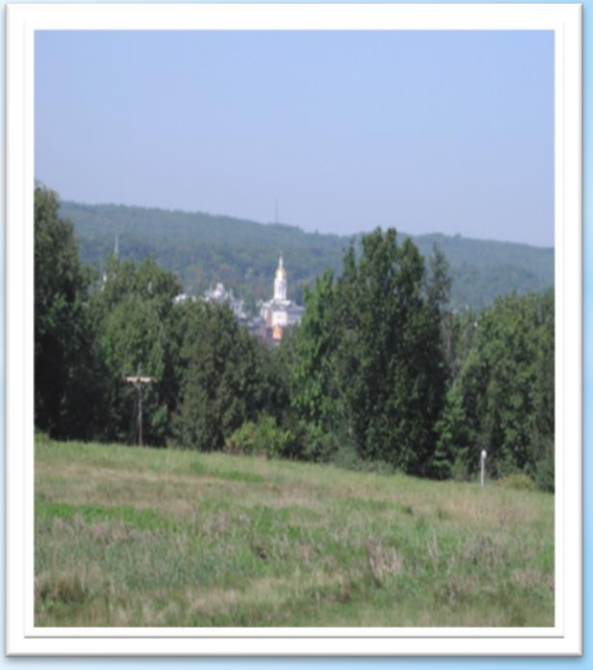
Post-Closure Inspection, Monitoring & Maintenance

- Follow your post-closure plan
- Regularly inspect, monitor, and maintain your landfill
- Maintenance includes repair



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Elements of a Landfill Inspection

A. General Site Conditions

B. Stormwater System Conditions

C. Decomposition Gas Control Systems

D. Cap (Cover) Conditions

E. Leachate Collection and Leak Detection Systems

F. Action Items

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General Site Conditions

General Site Conditions

General site conditions include:

- Access
- Signage
- Monitoring systems
- Other activities occurring

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General Site Conditions

Check the following:

- Is access restricted?
- Are there weather resistant signs?
- Are access roads in good condition?
- Are other activities occurring at the facility?
- Are groundwater monitoring wells in good condition?
- Are surface water monitoring points in good condition?

General Site Conditions

Action Items

Illegible landfill perimeter sign

Unsecured groundwater monitoring well

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General Site Conditions

Not maintaining the site properly may lead to:

- **Trespassing**
- **Vandalism**
- **Inaccessible monitoring systems**
- **Contamination of monitoring systems**

Action Items

Stormwater Management Systems

Stormwater Management Systems

Stormwater management systems include:

- Swales
- Berms
- Culverts
- Detention basins

Swales | Culverts | Detention Basin

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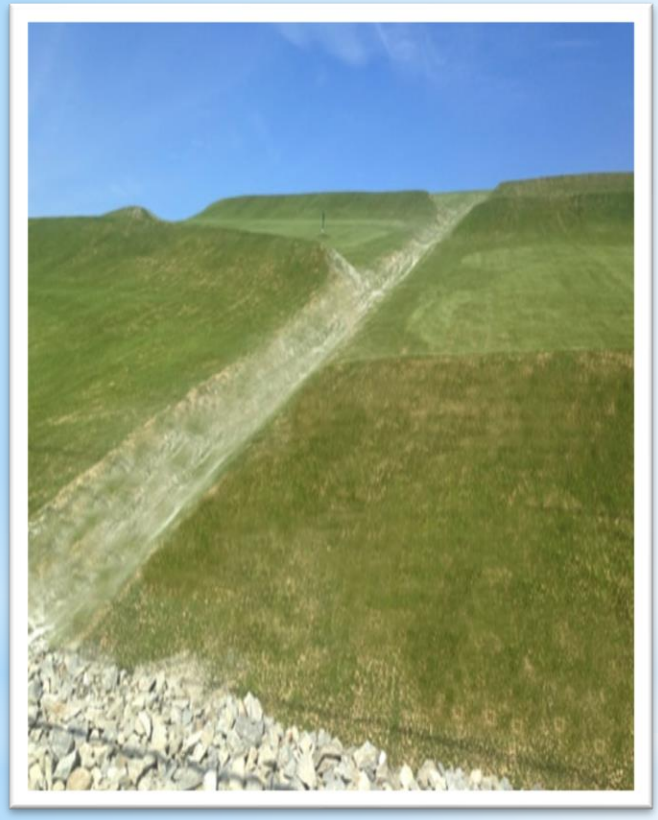
Stormwater Management Systems



Check the following:

- If detention ponds maintained
- If culverts are free of obstructions
- If drainage swales are unobstructed
- If berms, benches are in good condition
- If there is evidence of erosion
- If channels are protected to prevent scour
- If swales have positive drainage
- If storm drains are in good condition

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Stormwater Management Systems

Action Items

Woody vegetation and trees growing in drainage swales

Blocked culvert

Stormwater Management Systems

Not maintaining the stormwater management system properly may lead to:

- **Uncontrolled ponding/flooding**
- **Damage to cap**
- **Excess leachate generation**
- **Erosion/washouts**

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Decomposition Gas Control Systems

Decomposition Gas

Landfill Gas is created as wastes break down

Typically composed of methane, carbon dioxide and trace amounts of VOCs

Gases migrate along the path of least resistance, including laterally through soil

Gases must be controlled to prevent hazards to human health and safety, and the environment.

Action Item

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Decomposition Gas Control Systems

- Active System = Gas Extraction Wells
- Passive System = Gas Vents

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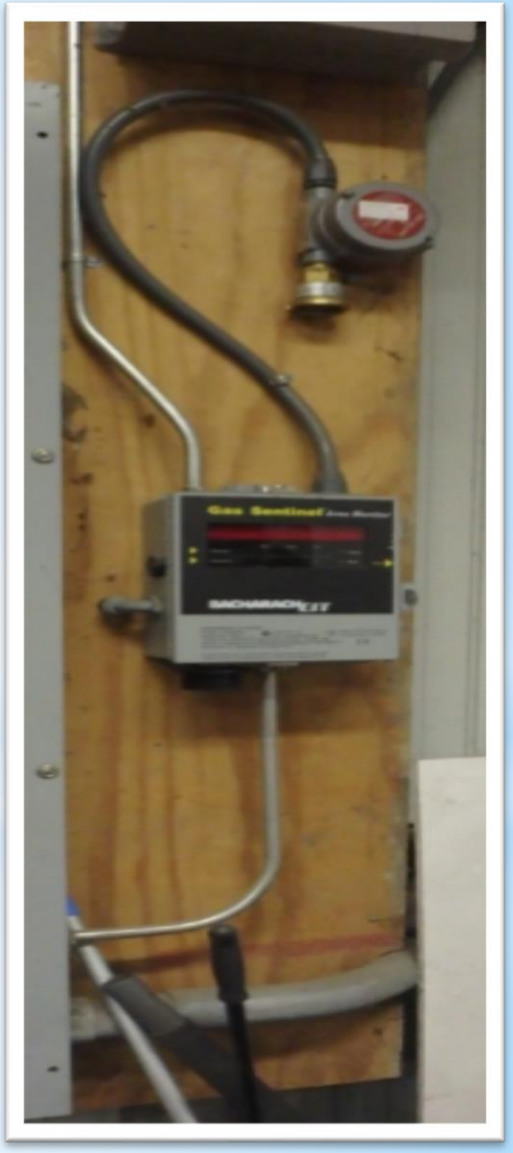
Decomposition Gas Control Systems

Check the following:

- If extraction wells or passive vents are in good condition
- If soil gas probes are in good condition
- If indoor air quality monitors are working
- If there are any landfill odors
- If there is evidence of stressed vegetation



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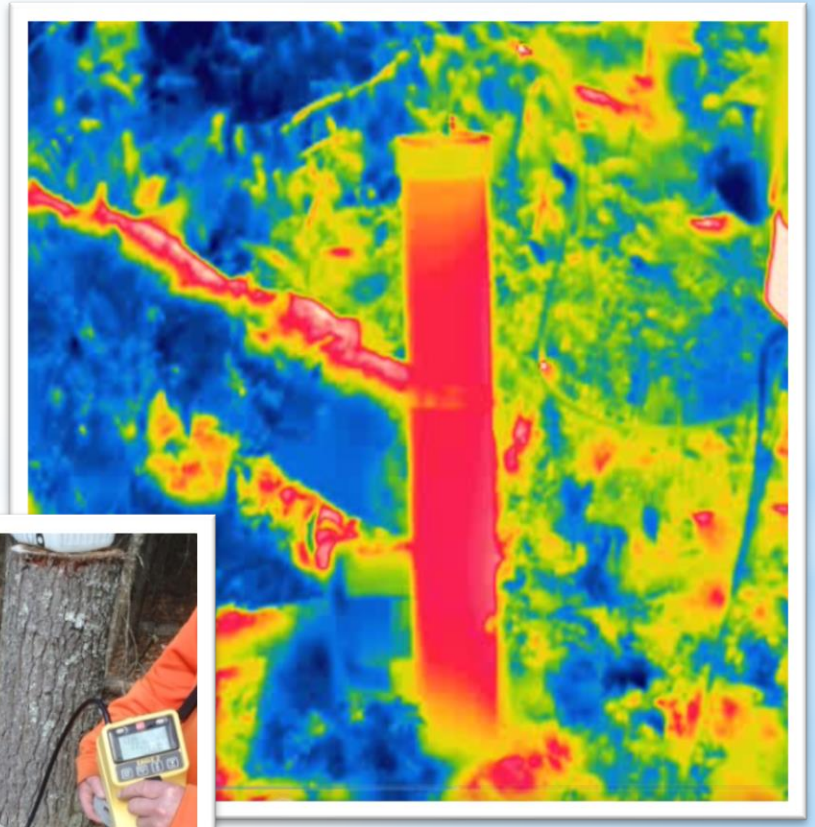
Decomposition Gas: Methane

Decomposition gas shall be sampled at soil gas probes and, if required, at gas vents.

Gas shall be controlled to not exceed:

>25% of the LEL
for methane
in structures
on or off-site

>50% of the LEL
for methane
in the soil
at the property line



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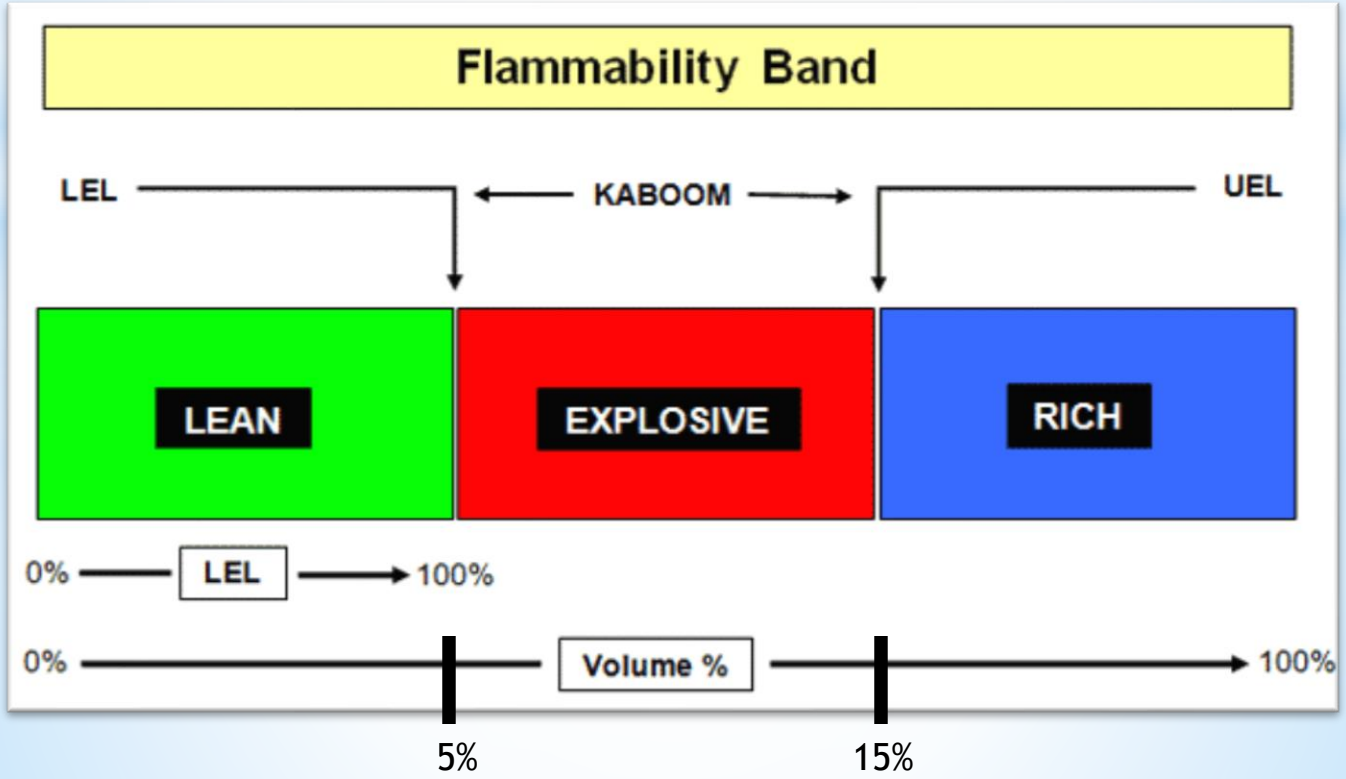
Decomposition Gas: Methane

If exceedance:

- Notify NHDES immediately
- Implement contingency procedures to ensure the protection of public health and safety



Decomposition Gas Control Systems

Not maintaining the decomposition gas control system properly may lead to:

- **Build up of explosive gases in**
  - **The landfill**
  - **Site structures**
  - **Utilities**
  - **Homes**

Action Item

Cap (Cover) Systems

Cap (Cover) Conditions

Engineered Cap or Soil Cover is what protects the waste containment system

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Cap (Cover) Conditions

Check the following:

- Uniform settlement
- Slope promotes runoff
- Mowed regularly
- Evidence of erosion
- Vegetative layer in good condition
- Damage from unauthorized access
- Damage from burrowing animals

Cap (Cover) Conditions

Action Items

Trees and shrubs growing on the landfill cap

Cap (Cover) Conditions

Not maintaining the cap properly may cause:

- Difficulty in assessing the cap condition
- Difficulty mowing
- Damage to engineered cap by roots
- Exposed waste from toppled trees
- More expensive to repair cap

Action Item

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Leachate Collection & Leak Detection Systems

Leachate Collection & Leak Detection Systems

- Leachate collection systems are located above the liner and take the leachate out of the waste containment system

- Leak detection systems are located below the liner and are used to check for leaks of the waste containment system

Leachate Collection & Leak Detection Systems

All landfills, check for:

- Leachate breakouts or seeps

For landfills with systems, check:

- If the system is functioning properly
- If the on-site storage is intact and adequate
- Confirm that the leachate is removed and disposed of regularly

Leachate Collection & Leak Detection Systems

Not maintaining these systems may lead to:

- **Leachate spills / breakouts**
- **Groundwater contamination**

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Groundwater Management Permit

Groundwater Management Permit

Vehicle by which the state requires groundwater quality monitoring.

- Goal is to protect groundwater quality

Permit details monitoring requirements including:

- Sampling frequency;
- Number of wells sampled;
- Compounds being analyzed for; and
- Reporting frequency.

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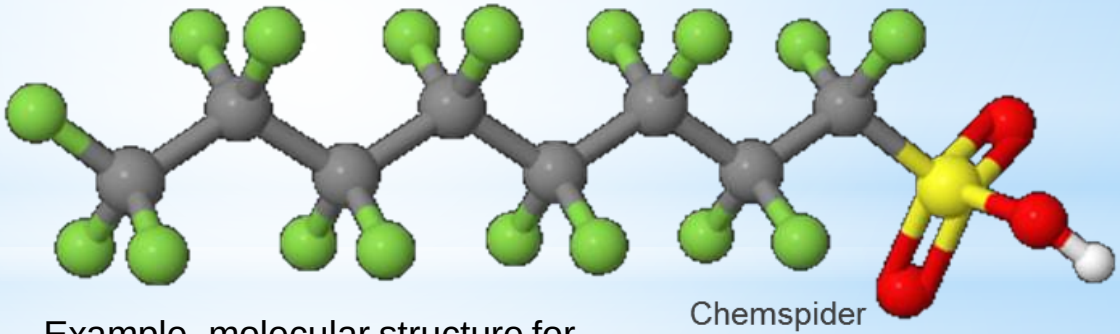
Groundwater Management Permit: Emerging Contaminants

- 1,4-Dioxane
- PFAS = PFOA + PFOS



Chemspider

Example molecular structure for perfluorooctane sulfonate (PFOS)

From: Hillary Thornton, USEPA Region 4

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Action Items

Action Items

- Inspections help you protect the closure system and identify action items.
- List your action items and a general timeframe for repair.
- In your next annual report, tell us what you did, how you did it, and send photos/documentation.

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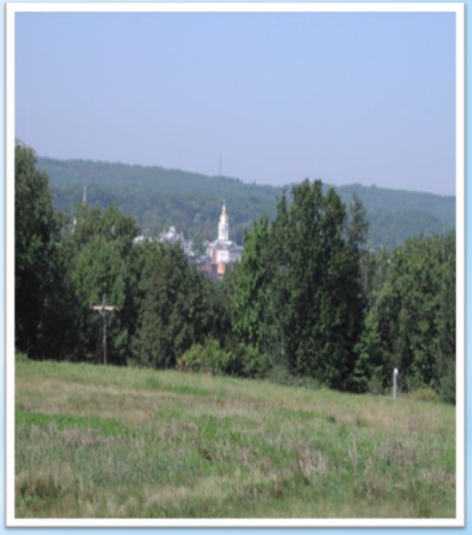
Performance Standards

Performance Standards

Goal: To achieve the "performance standards" in the NH Solid Waste Rules:

- Stop generating leachate,
- Stop generating decomposition gases like methane,
- Achieve maximum settlement,
- Remove harmful impacts to air and water, and
- Remove threat to human health and the environment.



Env-Sw 807.04

"Performance Standards"

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Post-Closure Reporting

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Due: March 31

Why Reports Matter

Compliance

- Law/Rules/Permit
- Refresher
- Action Plan

Information

- Data Collection
- Legislative Reporting
- Public Inquiries

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Due: March 31

A Good Inspection Report Includes Annual

A) General Site Conditions

B) Stormwater System Conditions

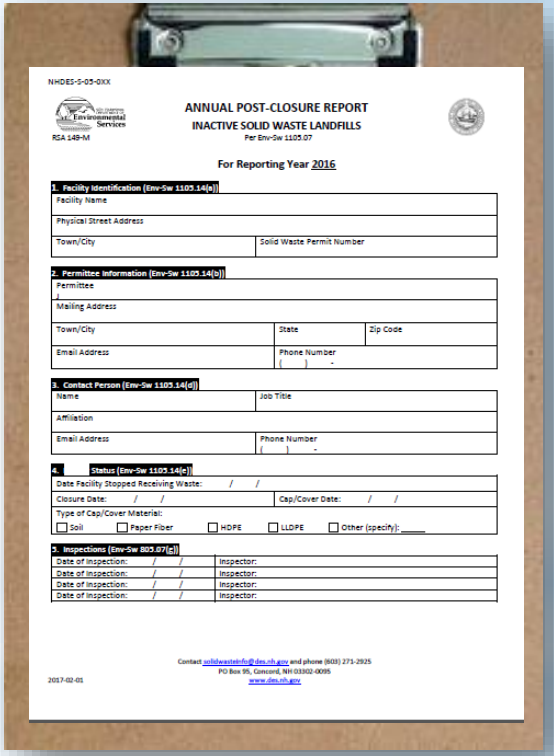
C) Decomposition Gas Control Systems

D) Cap Conditions

E) Leachate and Leak Detection Systems

F) Action Items

G) Summary & Assessment



NHDES-I-03-0XX

ANNUAL POST-CLOSURE REPORT
INACTIVE SOLID WASTE LANDFILLS
Per Env-Sw 1105.07

RSA 148-M

For Reporting Year 2016

1. Facility Identification (Env-Sw 1105.14(a))
Facility Name
Physical Street Address
Town/City | Solid Waste Permit Number

2. Permittee Information (Env-Sw 1105.14(b))
Permittee
Mailing Address
Town/City | State | Zip Code
Email Address | Phone Number

3. Contact Person (Env-Sw 1105.14(d))
Name | Job Title
Affiliation
Email Address | Phone Number

4. Status (Env-Sw 1105.14(e))
Date Facility Stopped Receiving Waste: / /
Closure Date: / / | Cap/Cover Date: / /
Type of Cap/Cover Material:
☐ Soil ☐ Paper Fiber ☐ HDPE ☐ LLDPE ☐ Other (specify): ____

5. Inspections (Env-Sw 803.07(c))

Date of Inspection: / /	Inspector:
Date of Inspection: / /	Inspector:
Date of Inspection: / /	Inspector:
Date of Inspection: / /	Inspector:

Contact solidwasteinfo@des.nh.gov and phone (603) 271-2925
PO Box 95, Concord, NH 03302-0095
www.des.nh.gov

2017-02-01

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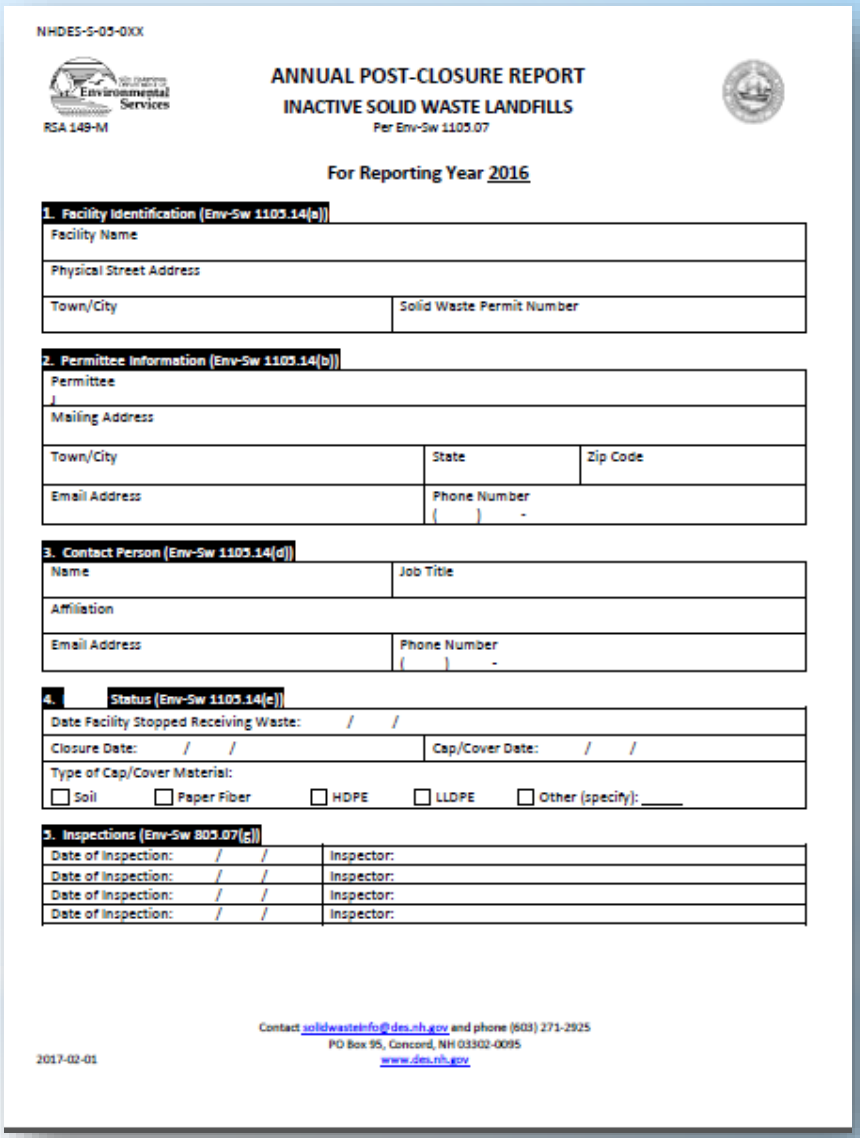
Due: March 31

Annual Post-Closure Report



NHDES-S-05-0XX

RSA 149-M

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2017-02-01

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Due: March 31

POST-CLOSURE REPORTS

Submitting Reports

- **Electronic:**

  Needs to be in **PDF**

  Submit through NHDES OneStop

  (https://www.des.nh.gov/onestop/)

  Site Code: 123456789

- **Paper:** Solid Waste Management Bureau
  NHDES
  PO Box 95
  Concord, NH 03302

Due: March 31

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Post-Closure Care Summary

- Landfills are a waste containment system
- Follow your landfill's Post-Closure Plan:
  - Inspect, Monitor, Maintain, and Repair your landfill
- Report your landfill's status to NHDES annually

Don't let a small problem become a BIG PROBLEM!!!

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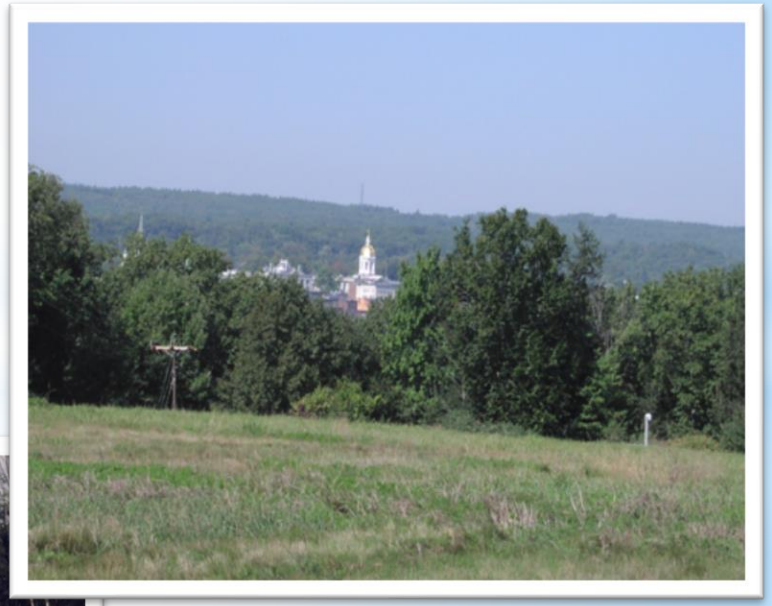
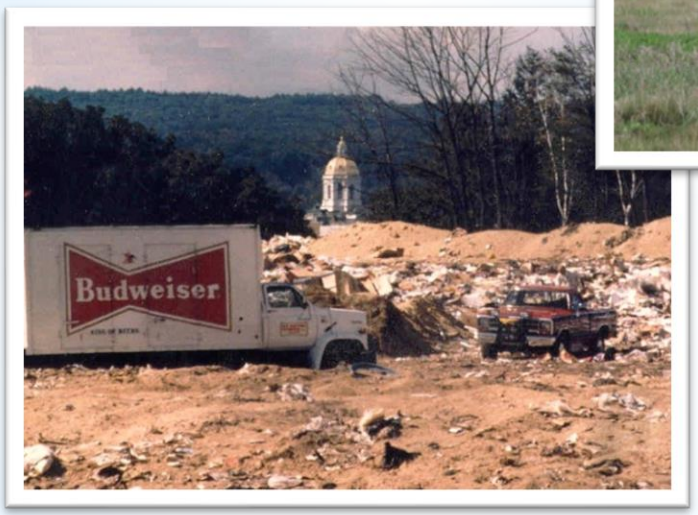
OBJECTIVE

To answer 2 questions:

- Why does my closed landfill still matter?
- How do I take care of it?





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Post-Closure Care of Solid Waste Landfills

Questions

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