



**BATTELLE**

# LANDFILL CONSTRUCTION AND OPERATIONS WORKSHOP

# TALLER DE CONSTRUCCIÓN Y OPERACIÓN DE RELLENOS SANITARIOS

No.	Module	Presenter
1	Importance of Proper Landfill Management	P. Ruesch
2	Landfill Construction Part I	M. Elizondo
3	Landfill Construction Part II	J. Davila
4	Landfill Operations Part I	M. Elizondo
5	Landfill Operations Part II	M. Elizondo
6	LFG Basics and GCCS	J. Davila
7	LFG Utilization Technologies	J. Davila
8	Open Dump Closure	P. Ruesch



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# Module No. 5 Landfill Operations Part II

Marcos Elizondo, WCA



# Daily Cover

- Minimum 15cm earthen material not previously mixed with garbage, rubbish or other waste
- Placement over any exposed waste at end of each work day
- Compacted



# Daily Cover

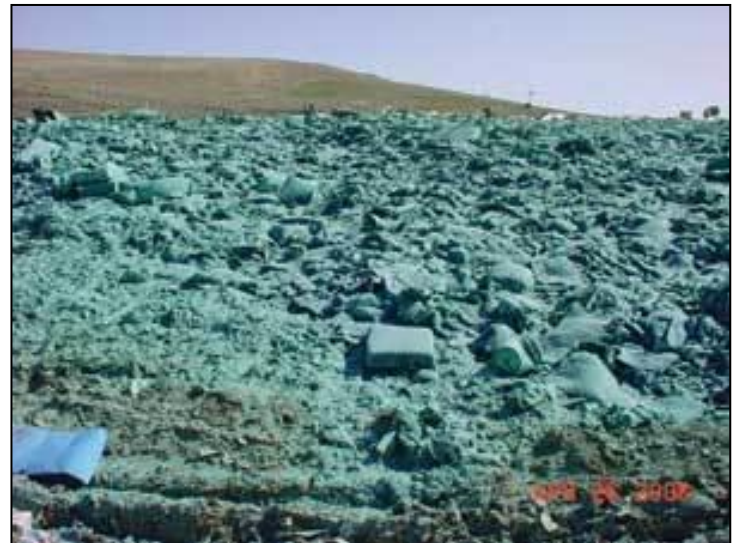
- Prevent disease vectors
- Control windblown debris and odors
- Reduce the possibility of fire
- Prevent scavenging
- Improve the operation of the landfill
- Decrease leachate amounts

# Daily Cover

- Slope to allow for drainage
- Compact with a minimum of 2 passes of bulldozer tracks
- Document where daily cover placed
- Inspect all areas for erosion, exposed waste, or other damage after rainfall even and repair as necessary
- Runoff from areas with intact daily cover is not considered as having come in contact with the working face or leachate (treat as surface water run-off)
- Inspect for seeps

# Alternative Daily Cover (ADC)

- Types
  - Synthetic material tarps, both reusable & sacrificial
  - Commercial foam products
  - Petroleum contaminated soils
  - Water treatment plant sludge
  - Other materials





# Alternative Daily Cover





# Stockpile

- Management of stockpile is key
- Stockpile access roads must be planned to/from daily active disposal area
- Plan stockpile area necessary and evaluate volume annually
- Need sufficient soil material to both cover waste and to construct new cells

# Intermediate Cover

- 15 cm of earthen material capable of sustaining native plant growth, not < 30 cm (including daily cover)



# Intermediate Cover

- Apply to areas that have received waste but will be inactive for > 180 days
- Apply native plant seeds
- Apply mulch to reduce erosion
- Grade for proper drainage to prevent ponding

# Final Cover

- Place as landfill sections reach final waste fill elevations
- Soil and/or synthetic materials
- Include erosion control structures
  - Drainage swales, ditches



# Final Cover

- Monitor to ensure identify erosion areas, leachate outbreaks
- Repaired as weather permits by restoring the cover material, grading, compacting & seeding
- Document in cover inspection record





# Final Cover

- Inspection record
  - Record inspections:
    - Daily cover
    - Alternative daily cover
    - Intermediate cover
    - Final cover
  - Corrective actions





# Litter Control

- Working face should be maintained/operated to control windblown solid waste
- Control measures include
  - Daily cover and alternative daily cover
  - Free-standing fences
  - Portable litter fences
- Litter along fences, access roads and gate should be picked up daily

# Litter Control

- Free-standing fence w/ fixed posts



# Litter Control

- Portable fences
  - Can be easily moved w/ dozer



# Litter Control on Access Roads

- Make sure all waste loads are enclosed or tarped to prevent it from blowing out

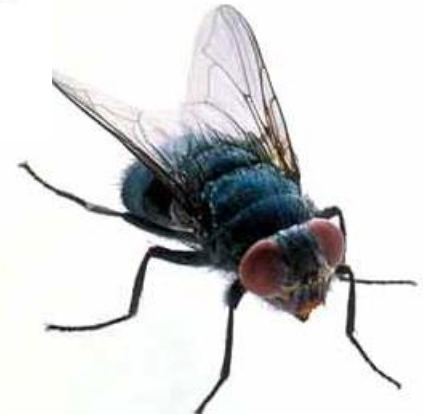


# Litter Control on Access Roads

- Inspect access roads daily up to 3 km from the entrance in both directions
- Return collected waste to working face
- Perform only during daylight hours

# Vector Control

- Avoid conditions favoring vectors
  - Dogs, birds, rodents
  - Flies, mosquitos
- Compaction
- Daily cover
- Stormwater control





# Vector Control

- Birds should be controlled using daily cover or alternative daily cover



# Storm water Control

- Prevent stormwater ponding in landfill areas



# Stormwater Control

- Remove ponded water with portable pumps or through re-grading
- Clean ponded water can be routed to stormwater drainage
- Treat contaminated water as leachate
- Do not recirculate ponded water into landfill cells

# LANDFILL GAS / ODOR MANAGEMENT AND CONTROL

# Air Quality and Odor Control Criteria

- Must meet all applicable regulations related to air quality
- Do not burn waste on landfill site
- Odors must be controlled to prevent reaching surrounding communities

# Odor Sources

- Waste
- Working face
- Leachate / condensate
- Ponded water
- Landfill Gas (LFG) system



# Odor Control

- Spread and compact waste properly
- Cover dead animals with 1m waste & 60cm soil material
- Place adequate daily cover
- Monitor for odors in leachate system
  - GCCS
  - Aeration ponds
- Standing/ponded water

# Odor Control

- Aerate leachate ponds
- Remove leachate for offsite treatment
- Remove ponded water



# Odor Control

- LFG control & collection systems (GCCS)



# Responding to Odors

- Determine odor source
- Remediation measures
  - Apply additional cover material
  - Use odor neutralizing agent
  - Control ponding
  - Add LFG extraction wells to existing GCCS
  - Seal leachate extraction pipes
  - Aerate leachate ponds
  - Contact an expert

# LFG Control

- Monitor presence of LFG
  - LFG monitoring probes
  - Buildings or structure within landfill property



# LFG Control

- If methane ( $\text{CH}_4$ ) concentration reaches:
  - 5% by volume in probes
  - 1.25% by volume in buildings or structures
- Implement procedures to protect health & safety
- Prepare remediation plan



# Leachate Management

- Leachate system facilities
- Operated to maintain 30cm or less of water column on liner
- Remove from landfill to storage & treatment facilities
- Maintain good operational conditions



# Leachate Management

- Removal through pumping systems
- Store in evaporation ponds



# Leachate Management

- Storage in elevated tanks





# Leachate Management

- Treatment plant



# Leachate and Condensate Recirculation

- Recirculation is a process of returning leachate or condensate to landfill cell
- Only in I that are designed and constructed with a leachate collection system and a composite liner
- No ponding
- Can be pump into wells place in the waste areas or in reinjection pipes
- Can be sprayed over the soil cover

# Leachate and Condensate Recirculation

- Spraying leachate over cover soils





# Inspections

- Administrative Inspection
  - Permits and authorizations
  - Inspection reports
  - Environmental monitoring reports
    - Groundwater
    - LFG
    - Stormwater
- Training



# Inspections

- Field inspections
  - Main entrance
  - Cover (daily, intermediate y final)
  - Liner system
  - Leachate collection system
  - Stormwater system
  - Perimeter
  - Monitoring wells and probes



# *Thank You*

Module No. 5

## Landfill Operations Part II

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