Landfill Fire Case Study
OCCURRENCE OF FIRES IN LANDFILLS

• Not uncommon!
• Average of 8,400 landfill fires reported each year (through National Fire Incident Reporting System (NIFRS))
  – Includes refuse disposal areas, trash receptacles, and dumps in open ground
• Many not reported
• Reported Events in MO: 4 events in 2016 and 6 in 2017*
• Nationwide 77% increase in events in first part of 2018*

* Source: Ryan Fogelman, Fire Rover, LLC – rfogelman@firerover.com
Other sources indicate:
- One in 200 fires escalate to a major incident, or 42 major incidents per year
- Probability of small fire >50%, major fire 0.05%
OCCURRENCE OF FIRES IN LANDFILLS

• Causes:
  – Chemical reactions
  – Reactive materials
  – Overdraw of landfill gas systems
  – Smoking or sparks
  – Landfill equipment
  – Lightning strikes
  – Hot loads
PLAYERS INVOLVED

• Typically handled by landfill staff
• Escalated incidents:
  – Local fire department
  – Mutual aid fire departments
  – Hazmat crew
  – Emergency management
  – Department of Natural Resources
  – Equipment operators
  – Plus more!
Case Study Summary:
• In 18 hours, a small surface fire...
  – Engulfed 9.5 acres
  – Destroyed the liner system
  – Destroyed the leachate system
  – Impacted groundwater underdrain system
• Fire occurred on the Saturday of Memorial weekend
• Lasted 4 months
• Approximately $3 million to extinguish and mitigate (doesn’t include reconstruction costs)
LANDFILL FIRE CASE STUDY

• 146,500 Population of service area (2016)

• 75,000+ Kinnick Stadium population on game day
LANDFILL FIRE CASE STUDY

- 127,000 tons per year
- 4 Million tons of waste in place
- LFG Gas system
- 70 vertical & 9 horizontal gas wells
- Flare operates at ~850 CFM
LANDFILL FIRE CASE STUDY
So what happened to get us from this...
LANDFILL FIRE CASE STUDY

To this...
• Large open cell – Time to complete first lift
• Daily cover use
• Soil excavation and transportation ability
• Fire hydrant proximity
• Coordination/Communication with FDs
• Holiday weekend
• Winds
• Bad luck
**LANDFILL FIRE CASE STUDY**

**14 Acre cell**
- 4’ Compacted clay
- FML
- Geotextile
- 1.5’-3’ TDA (1.3 million shredded tires used)
- 1 year to complete 1st lift
**1 Week before fire**
- 15’ – 20’ of waste in place
- 5-6 months of filling
- TDA fully installed and approved by DNR
LANDFILL FIRE CASE STUDY

BARKER LEMAR
ENGINEERING CONSULTANTS
Saturday, May 26, 2012

- 5:30PM – No smoke

- 6:38PM Iowa City Fire Department (ICFD) was paged for smoke near the Iowa City Landfill

- FD did not have key to electric gate. Waited at gate for Landfill staff

- Landfill staff being called back
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Who do you call?
ICFD On-Site and Support FDs Arriving

- Establish protection
- Perimeter watch and security

Landfill Staff Arriving

- Opened gate
- Start explaining landfill and infrastructure to FD

- No initial command post established or communication plan as FDs and landfill staff continued to arrive.
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Water
- 2 miles to closest hydrant

Dirt
- 14 cy pull scrapper
- 17 cy scrapper
- 2 Dozers
- 2 Compactors
LANDFILL FIRE CASE STUDY
Initial Progress

- 3rd Fire break seemed to be holding

- Started to concentrate on the garbage fire

- Unseen/Unknown concerns...
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**First Night**

- Fire breaks held
- Fire trucks left
- Fire watch established
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Press Release (1:30AM)

Alluded that the emissions from the fire were similar to car exhaust and camp fires.

Indicated that exposure to the chemicals in the smoke were not significantly greater than daily background levels.

• Short news cycle

• Public relations officer took charge from there on and did outstanding job
Day 2

- Strong winds from SW
- Fire breaks breached around 8AM
- Grass fire concerns
- Fires heading towards other cells and LFG wells
- Incident Command Post established at City Hall
- Initial plume modeling
LANDFILL FIRE CASE STUDY
**First 18-Hours**

- 9.5 acres engulfed

- Fire eruptions from leachate lines

- Liner systems destroyed

- Leachate systems destroyed

- Groundwater underdrain system impacted
**Concerns**

- Current TDA and garbage fire
- 40 years of waste in adjacent cell
- Pools of burning liquid appearing
- LFG well network
- Smoke traveling for miles
- Hydrocarbon odor complaints 8 miles away
- Waste disposal needs do not stop
Concerns

4 Million gallons of gasoline (TDA)

1.2 Million gallons of gasoline (MSW in place)

5+ Million gallons of gasoline
Pyrolytic Oil

- One tire = 2 gallons of oil
- Leachate system connected to sanitary sewer
- What is it? How does it act? What are the concerns? What can we do with it?....
LANDFILL FIRE CASE STUDY

Pyrolytic Oil

• ~100,000 gallons
• Flashpoint below 100 F
• Air temp was 105 F
• Liner temp was 125 F
Pyrolytic Oil

- Volunteer FD staff put on lagoon watch
- Foam truck resource acquired from Regional Airport
Pyrolytic Oil

- ICFD Called to trailer court to flush sewer line due to hydrocarbon odor ... twice.

- Connected dots to the landfill...

- 2 Lift stations impacted

- 10 miles of sewer line impacted
Help Begins to Arrive

- Landfill Consultants
- Landfill Construction Contractor
- DNR
- EPA
- County Emergency Management
- County Health Department
- State Hygienic Lab
- City Departments
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Pyrolytic Oil

• Collection

• Disposal

• Reuse?
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LANDFILL FIRE CASE STUDY

Stir, Burn, Cover

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Decisions Made

- Rebuild cell at ½ the size
- Utilize TDA as drainage layer
- Stockpile/use in-place select waste to quickly complete first lift
- Changes to CQA procedures
- Minor tandem TDA placement and first lift operations
- Strengthen daily cover placement
Lessons Learned

• Proper and knowledgeable air monitoring right away
• Knowledge to interpret air quality results and authority to act
• Representative of FD Safety Branch on-site to brief personnel and ensure adherence to identified safety procedures

• Joint daily meetings – Include “What else can go wrong” thinking/planning
• Develop/Communicate Incident Action Plan for every operational period and daily tactics
• Improved shift change/hand-off meetings - Coordinate crews engaging/disengaging so current information/assignments can be shared
Lessons Learned
- Updated contact lists and who to call if ‘Plan A’ isn’t available
- Mobilize support groups sooner
- Re-assign daily FD/Landfill management/planning responsibilities
- Fixed water supply at Landfill
- Keep all personnel well fed, watered, and rested
- Improve communications
- Develop and train against a plan
2016/2017 Landfill Fire Management Plan

• Contacts/Resources
  – FDs; Local/Regional EMA; Air monitoring; Regulators; Heavy equipment contractors; Hazardous waste disposal contractors; Suppliers for foam, radios, catering, restrooms, showers, job trailers; media; etc.
2016/2017 – Landfill Fire Management Plan
• Incident command structure (simple/complex)
• Site and infrastructure maps
• Landfills/Waste 101
• National Incident Management System and Incident Command Structure (NIMS) 101
• Landfill Fire Causes and Detection
• Environmental and Health Concerns
• Landfill Fire Management and Strategies
• Landfill Fire Minimization Strategies
• Training and Recommendations
LANDFILL FIRE CASE STUDY

Training
- 2 Training events
- 32 attended
  - 20 FD
  - 5 Landfill
  - 3 County EMA
  - 4 DNR
Post Plan and Training

• Knox box at gate
• Current site map on wall in office
• Installed FLIR cameras at scale house and overseeing working face along with automated notification and remote access system
• Good coordination/response/actions during recent small after hours fire
What Would You Do?

• Who would you call?
• Where is your nearest water source?
• Can you communicate with responding FD units?
• How much and how quickly can you move soil?
• Operational status of your equipment to combat fires?
• What would your operators wear/breathe and how would they be rescued?
• LFG System – Turn off or isolate?
• Leachate management?
• Interoperability of your equipment with FD’s equipment
• Clear Unified Incident Command structure and assignments?
State Contacts:

- **MoDNR Environmental Emergency Response**
  - (573) 634-2436
- **MoDNR Solid Waste Management Program**
  - (573) 751-5401
- **MoDNR Air Pollution Control Program**
  - (573) 751-4817
- **Bureau of Environmental Epidemiology (MoDHSS)**
  - (573) 751-6102
- **State Emergency Management Agency**
  - (573) 526-9100
  - Sema.dps.mo.gov
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Contact Your Local Emergency Management Agency

Your county or municipal emergency management director is the best source of information on local conditions and programs, along with assistance that may be available due to a recent federal disaster declaration.

Choose a county
- - Select - -

Camden County

Emergency Management Director or Floodplain Administrators for Camden County are listed below. View the contact for your city by scrolling. If your city does not appear in the list use the contact information of the county representative.

Camden Co.
Ronald Gentry
12 VFW Road
Camdenton, MO 65020
(573) 346-7108

Lake Ozark
Mark Maples
PO Box 370
Lake Ozark, MO 65049
(573) 365-5371

Stoutland
Frank Logan
111 E State Road H
Stoutland, MO 65567
(417) 286-4503

Camdenton
John McNabb
437 W. Hwy 54
Camdenton, MO 65020
(573) 346-3600

Linn Creek
Virginia (Ginny) Mueller
203 N. Lake St.
Linn Creek, MO 65052
(573) 346-6200

Sunrise Beach
Brian Scheter
PO Box 348
Sunrise Beach, MO 65079
(573) 374-8782

Climax Springs
Ronald Gentry
12 VFW Road
Camdenton, MO 65020
(573) 346-7108

Osage Beach
Todd Davis
1000 City Parkway
Osage Beach, MO 65065
(573) 302-2010

Village of Four Seasons
Cynthia Lonergan
133 Cherokee Rd
Lake Ozark, MO 65049
(573) 305-3833
THANK YOU!

Q & A

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