Landfill Fires

According to the US Fire Administration, there are around 8300 landfill fires a year. Landfill fires vary from minor surface outbreaks, to massive subsurface events that burn for years. One surface fire in Mumbai in 2016 was visible from space Click here, while a subsurface landfill fire outside of St. Louis has burned since 2010 Click here.

Though nearly all landfills experience some type of landfill fire, the sites ability to prevent, detect and fight landfill fires can make the difference between a manageable incident and a major environmental and safety disaster

Landfill fires generally fall into two different categories: Fires on the surface of the waste mass and subsurface fires buried within the waste mass.

Surface Fires
Small controllable surface fires in the waste mass are relatively common and can occur for a variety of reasons. Sources may include lithium-ion/lead-acid batteries, combustible chemicals, smoldering coals/ash, propane canisters, hot wastes, lightning and arson. Heavy equipment in waste can cause pressure, friction and combine incompatible waste types. If identified quickly, small surface fires can be extinguished effectively by trained landfill operators before the fire department gets involved. Typical refuse firefighting methods include:

- Smother in place with moist refuse or cover material, or isolate and remove burning material from active face and smother fire with soil provided by scrapers or haul trucks
- Dozers and compactors can excavate burning refuse and isolate it from the working face, careful not to engulf or ignite the equipment
- Dozers and compactors can push soil over burning areas until smothered
- Water trucks can provide water to soak smoldering material
- Extinguished material should be isolated and observed for at least 24 hours before landfilling

If unsure of ability to extinguish a landfill surface fire, call 911. Sites should have a Fire Prevention Plan that identifies responsible parties and outline duties and procedures in the event of a fire.

Subsurface Fires
Subsurface fires are very different from surface fires and are more accurately characterized as oxidation events, or pyrolysis, where the thermal reaction takes place in an oxygen-starved environment and the combusting material is consumed slowly and at low temperature. They can be difficult to identify and can occur as depressions, sunken areas on the landfill surface, burning odor, smoke emanating from cracks in the cover, or the presence of CO and high temperatures in landfill gas well readings. Causes can be a buried heat source, reactions between incompatible materials in the waste mass, heat from biological decomposition of organics or chemical oxidation where the rise in temperature in the waste mass cannot dissipate the heat faster than it is being produced. Layers of cover soil within the waste mass may affect how the combustion propagates as they can act as a barrier within the waste. An effective method of extinguishing subsurface fires is to cut off what little oxygen intrusion may be supporting the reaction. Starved of oxygen, subsurface events typically die off, but as in the example above, the process can take months or even years. Subsurface firefighting methods may include:

- Capping the landfill burn area with soil (most common and cost-effective method)
- Flooding the burn area with water (may be difficult to get water to the affected area and messy)
- Capping the landfill burn area with a geomembrane (expensive)
- Injecting inert gas such as CO2 or N2 to displace oxygen (expensive and complicated)
- Excavating the burning material extinguishing with soil, water or foam (risky because introducing oxygen)

Prevention
Awareness of incompatible waste types and hot loads coupled with careful observation of waste placement by trained site personnel are key to fire prevention. In addition, best practices such as maintaining good compaction, minimizing the size of the working face, effective site security and active fire watch are important prevention mechanisms.
Fire Prevention Plan training and training with local fire departments is critical to fire readiness at the landfill. Occurrence of landfill fires is not a question of if, but when, thus it is critical site personnel are trained to identify, isolate and smother fires and your local fire department is familiar with site access, location of water sources and site contacts.

Please make sure your Fire Prevention Plan is current and your employees have been properly trained.