



January 19, 2010

**Reference: *Landfill Odour Source and Control*
*Crane Mountain Landfill Report to CMEI***

BACKGROUND

Landfill odours occur typically due to the decomposition of organic material (food waste, paper, wood products, etc.) by bacteria in the landfill. The amount and type of gas is influenced by the creation of a growth environment for bacteria which in a simple landfill system includes a food source, lack of oxygen (anaerobic bacteria), heat and moisture. The benefit of this occurring is that the landfill cell eventually “dies” as the food is eaten and sheer gravity and consumption causes the material settle and harden preventing moisture penetration as well. By eliminating these two components required in the bacteria life cycle, negligible gas will be produced.

Decomposition of waste begins immediately at the source (homes, businesses, etc.). Composting is a proactive step to divert bacteria food sources from the landfill and if maximized would essentially eliminate gas production from landfill cells. Despite this approach, food for bacteria ultimately makes it to the landfill and reactive measures must be taken. Effective daily cover is the first step to controlling immediate odours from ‘new’ garbage. The further use of intermediate cover also serves to control odours; however, as the garbage piled in the cell over a period of time, the decomposition will accelerate as growth conditions become ideal for anaerobic bacteria. This results in the uncontrolled release of gases and migration of gas unless control measures are put in place.

CONTROL MEASURES

Gas control measures at Crane Mountain include a liner system that prevents gas migration into the ground, a cap (liner system and vegetation) that minimizes migration into the air, and gas wells which are located in the cap to allow for gas collection as gas will travel along the easiest path which is through the well piping. The gas wells are connected to the single header pipe which feeds an enclosed flare that destructs the gas at about 1700F. With a methane concentration of 40-50%, this results in an ideal destruction environment for all gases present including odourous compounds (methane has no odour but is required for the burn). Prior to the summer of 2009, Crane Mountain had 22 active wells. Since then, 15 new wells have been installed and are being commissioned with the installation of the cell #4 cap.

EVENTS

There have been two sources of odours to the immediate area of the landfill.

1. First, the original 22 well system in cells 1, 2 & 3. The first half of 2009 we experienced abnormal amounts of precipitation which was able to substantially penetrate the cells via uncapped faces on the northern and eastern slopes cell #3 and northern slope of cell #2. Essentially, this saturated the waste in the cells and would travel the path of least resistance filling the wells with water, preventing gas flow. Gas will not penetrate water so the gas took the next easiest path which was out the uncapped areas and into the atmosphere. This would not clear until the water eventually made its way to the leachate system. The other compounding and contributing factor to this was that the pipes connecting the wells together experienced condensation due to the high moisture levels in the wells and heat from the cell and subsequently filled with water causing obstructed and interrupted flow of gas to the flare which would cause it to shut down automatically. Again, this would force gas to move the next path of least resistance which would be out the uncapped areas.
2. Second, was the cell #4 capping project which began in the summer of 2009. Cell #4 has three plus years of garbage and the gases were already being produced. As the cap was placed it provided an oxygen free atmosphere which would idealize the gas producing bacteria growth. Then, well drilling provided an easy path for gas to accumulate and flow into the atmosphere. These wells are now installed and sealed, however, there is still a large accumulation of water and ice in the pipes which has not dissipated, because the bacteria environment has not heated up yet. We now have seven of the 15 new wells operation, but are still experiencing some gas migration because of the others.

Cell #5 is not producing any gas migration. It continues to be covered daily and certain areas have been covered for intermediate cover.

ACTIONS

1. The new wells have been connected using piping that has been sloped to a higher grade to fall back into the wells so that condensation falls back into the cells to prevent water "pulses" to the gas flare (and subsequently electrical generator) to keep it running smoothly.
2. We have purchased a new portable pump which will allow us to drain each of the wells individually if they fill with water due to weather or condensation.
3. We have increased the staffing from 20 hours per week to 40 hours per week to focus on 'balancing the well field' to account for differing weather conditions. This focus will also allow us to bring the remaining eight wells online.

4. We have decreased the tipping fee for composting to \$28 from \$35 to encourage more diversion in the ICI (industrial, commercial, institutional) sectors so we can minimize future gas production.
5. We have simplified and invested in a new recycling system to encourage more diversion of materials such as paper and cardboard, but also new products like milk cartons of which all contribute to landfill gas.
6. As landfill gas is heavier than air, we have invested in fixed and portable methane detection systems which will warn us of any significant accumulation of gas that would pose any further dangers other than odour.

We will continue to focus on the best service possible and investigating new opportunities as they arise. This includes maintaining the hotline contact and investigating incidents. The system operates automatically 24 hours per day and all events on the flare are recorded (events attached). This allows us to confirm the sources of landfill gas odours which may come from the site. We have been able to confirm the majority of complaints occur when our flare is down. We also have been able to identify a number of incidents of burning garbage including two which we were able to identify and report a suspect to the Department of the Environment. There have been no consistent reports or literature that would lead us to believe our compost system is a source of odours migrating from the site.

Since the system was new to us in 2008 and the industry is very young (about 10 years), landfill gas will still have its challenges. We will strive to avoid maintenance of the flare and/or generator during 'low ceiling' weather events and we will try to identify a method of effective communication around major adjustments to the system such as new wells with each cell capping event. We are also investigating installing piping as we go, but this is relatively new technology and there are real fire risks associated with this approach.

Weather continues to be the biggest challenge for operation of the system and we are mitigating that as best as possible. Otherwise, we encourage citizens to call our hotline with any issues so we can readily identify the root causes and take care of them.

Marc MacLeod
General Manager

Gas Flare Operations

Downtime Notes - Last 6 months operation of '09

- Average of 4 to 6 hours down time per month during summer months due to scheduled & unscheduled shutdowns
- Some flame flaring & smoking due damper motor coming out of adjustment & gulps of water cooling stack down
- August through November – installation of new gas field w/ trenching
- Drilling into garbage from end of August through to October
- Failure of damper motor actuator on Oct 16th
- New motor sent overnight from Tulsa OK
- Held up in customs until received on Oct 23rd
- Flare was down during this period – reactivated on the 23rd
- Average of 8 to 10 hours down time per month during late fall & winter months due to scheduled & unscheduled shutdowns
- Most unscheduled shutdowns are due to cold weather affecting block valves to stick due to close tolerances in their set points
- Flare shutdowns are usually less than 2hrs at a time
- Additional down time was encounter due to the following scheduled maintenance
- Blower fan alignment in June & Nov – ½ day (done twice per year)
- Shutdown for water control – 7hrs on Dec 21st
- Flame arrestor cleaning – 7hrs on Dec 22nd