

Leachate Quantities after Closure of a Landfill

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Criteria for the solid waste landfills (40 CFR Part 258 or the Subtitle D Federal) have been around for over 30 years and many municipal solid waste (MSW) landfills have been constructed with lining systems in accordance with the Subtitle D requirements. However, very few Subtitle D landfills have been entirely closed with final covers that include a geomembrane barrier layer. The significance of the final covers with geomembrane is that percolation of rain water into the landfill essentially stops following completion of the final cover. Assuming the final cover system remains intact, leachate that continues to be generated after closure will consist of excess liquids already in the waste mass that migrate to the leachate collection system and moisture released during the waste degradation process.

Published data relating to leachate quantities collected from fully closed, Subtitle D landfills is very rare. Having more published data would be helpful to the industry and improve our understanding of our long-term liabilities associated with managing leachate during the post-closure care period and support technical discussions with regulatory agencies during approval of long-term care cost estimates.

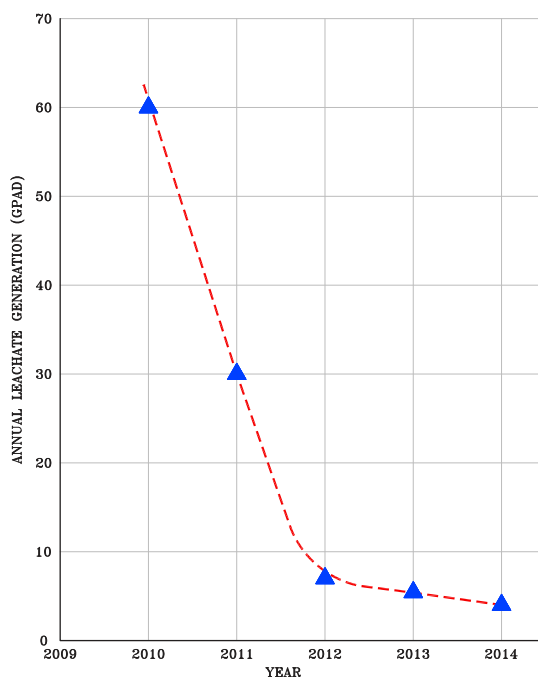
Leachate Generation Changes

I was able to review data from one small Subtitle D landfill in southern Florida that serves as good case study demonstrating how leachate generation changes following closure. The 6.5-acre Glades County Landfill was closed in a single construction event in 2010.



Glades County Landfill after closing.

Since the landfill was closed in one single construction event, rain water percolation was essentially eliminated almost instantaneously considering the 20-year time frame the landfill was open. It is important to note that the maximum thickness of waste in the landfill was approximately 40 ft. and no leachate recirculation was taking place during the active life of the landfill.



The downward trend of leachate generation after closure.

The leachate quantities for the period of 2010 through 2014 were obtained and analyzed. The data clearly shows a downward trend of leachate quantities following closure, as would be expected. Leachate collected from the landfill during 2010 was reported on a monthly basis when leachate quantities after closure were still high and needed to be removed from the facility for disposal every month. However, leachate quantities rapidly decreased and monthly shipment of leachate was no longer necessary;

instead, leachate was removed when the storage tank reached a point that the leachate had to be removed and quantities reported. Therefore, the data did not have monthly values, but clusters of several-months data. The data was reviewed, monthly data gaps were filled in by interpolation of the available data, and the data was then annualized. The annualized leachate quantities after closure of the landfill varied from approximately 143,000 gallons per year in 2010 to approximately 12,000 gallons per year in 2014. Efforts are being made to obtain more data for 2015 and thereafter to get a clearer picture of leachate quantities collected from the landfill.

Average Leachate Quantity

The data was reduced to gallons per acre per day (gpac), which varied from approximately 60 gpac in 2010 (immediately after closure of the landfill) to approximately 5 gpac in 2014. The chart illustrates the reduced annual data, which supports the decreasing trend in leachate generation over time. The decreasing trend is much faster than most solid waste professionals have predicted and used in the long-term care cost estimates for landfill facilities that they work on.

I have used numbers as large as 100 gpad average leachate generation over the 30-year long-term care period in the past; however, I now believe that the average value over the 30-year long-term care period might be much lower than 100 gpad.

It should be noted that the quantity of leachate depends on thickness of waste in the landfill and the storage capacity of the waste column. Another factor that affects leachate quantities after closure of landfills is leachate recirculation prior to closure of the landfill. If leachate recirculation had been taking place during the active life of the landfill, more liquids would be anticipated coming out of the landfill after closure.

In conclusion, the solid waste professional may use average leachate generation values as low as 25 gpad in long-term care cost estimates if the landfill is a low to medium rise landfill. Larger average values may be used for taller or deeper landfill or landfills with active leachate recirculation prior to the closing. I also recommend that those solid waste professionals responsible for closed Subtitle D landfills that have a liner below the entire waste mass carefully track amounts of leachate removed from the landfill and publish their data for general use by other professionals in the industry.

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Pre-Trips for Success!

Larry Stone, Waste Connections, Inc.

Most of us know the importance of a good pre-trip to ensure your equipment is ready for the day. However, before your employees approach the yard, you need to make sure that *they* are ready for the day as well. Today's management teams have great tools to measure all aspects of the waste collection and disposal operations. The solid waste industry prides itself on great customer service. Evidence of that is clear—miss a home on your route or cancel the normal collection for any reason, and see what happens. So, when do we pre-trip our employees?

We all have seen the posters: “Employees are Our Most Important Asset” or “We are Employee-Driven”, etc. These statements are great marketing tools and insurance companies love to see these sentiments in writing, but do they reflect what really happens on the job? Who is there to greet the employees each morning or at the beginning of their shifts? Yet, we expect each employee to be professional. We say things like, “Hey, these are our customers; without them, we don’t have a job,” or “Be professional at all times.”

Think of your employees as if they were your customers. They expect and deserve great leadership. Well-trained employees will exceed expectations only when you “inspect what you expect”, “reward excellence”, and “hold everyone accountable to the same rules.”

Most of us have heard about the 80/20 rule. When it comes to our employees, we usually spend 80% of our time with 20% of the workforce—usually with those who need special attention or have become problem employees. That means that the 80% of the employees who are doing a good job only see you 20% of the time. Therefore, try to find new ways to promote the positives. Engage those who are exceeding expectations to provide other employees with keys to their motivation.

Too often managers are busy during the beginning of the day. They also want to get caught up and seem to end up behind a desk during clock-in. However, this is the most critical time to promote the necessary keys to a successful day. It starts with showing appreciation to the employee. It sure sounds good to me when my boss says, “Hey man, thank you. I may not say it enough, but I appreciate what you do.”

Finally, we can learn how to show more respect to our employees. You show respect by caring about what is important to the employee, and know what motivates him or her. It requires sincere listening and taking an honest interest in the issues that keep your employees up at night. You may not be able to resolve all of their issues or concerns, but sometimes showing you care just by listening is helpful.

The next time you have a few minutes, do an online search for “Dale Carnegie, Gold Book.” It’s a free download and it will make you think differently about how you treat your most valuable asset—your workforce. You may just want to pre-trip your employees tomorrow morning.

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