

## Investigating Landfill Leachate Seeps

Preventing leachate from impacting surface water during construction and before the final cover placement is imperative. Proactively monitor seeps before they become more than a headache to keep your operations plan up-to-date and regulators happy.

By Daniel Ray

LEACHATE IS A LIQUID THAT HAS PASSED THROUGH OR emerged from solid waste and contains soluble, suspended, or miscible materials, as defined in Title 40 of the Code of Federal Regulations (CFR) part 258 and state regulations such as Chapter 62-701 of the Florida Administrative Code (FAC).

Leachate can contain a multitude of constituents of environmental concern, including ammonia, total suspended solids (TSS), chemical oxidation demand (COD), heavy metals, and per- and polyfluoroalkyl substances (PFAS), to name a few. Because leachate contains constituents that can harm human health and the environment, substantial consideration is given to capturing, collecting, and managing leachate as part of the final landfill design.

Preventing leachate from impacting surface water during construction and before the final cover placement is also imperative. When left unchecked, leachate seeps can travel downslope, impact surface water and the surrounding environment, compromise slope stability, and create a compliance issue for the waste facility.

### Spotting Seeps

Leachate seeps from relatively wet landfills are a fact of life for some operators. They increase in intensity and frequency after a storm. Leachate seeps are a flow or leak of leachate out of the landfill surface side wall that may occur during landfill construction before placing the final cover to constrain the waste and leachate.

Leachate seeps can form in several ways, but the most common formation mechanism is leachate flowing downward through the landfill waste until it reaches a continuous lateral layer that is less permeable than the horizontal layer above it. An example of this is a highly compacted continuous waste layer with a more porous daily cover layer on top of it. The leachate traveling downward collects above the lower permeability layer. Then, it moves laterally through the higher permeability layer until it reaches a location where it can discharge, which is often a side slope surface. In essence, leachate will follow the path of least resistance, and when that path is lateral, it can form a leachate seep. Leachate seeps can be readily recog-

nized by the dark-colored liquid flowing out of a side slope, pooling on a side slope, or saturating areas with dead vegetation, as shown in **Figure 1, page 21**.

### Get Moving

When first noticing signs of a leachate seep, it is important to investigate as early as possible to identify potential risks and develop design solutions to mitigate them. Landfill staff perform daily visual inspections, recording and sharing any sightings during daily landfill operations with other staff. Identifying the cause of a leachate seep is a crucial first step in the process and is most efficiently done through investigative measures.

Approach leachate seep investigation in various ways depending upon several factors that impact the investigation approach, including:

- Location of the seep on a side wall
- Proximity to surface water
- Volume of leachate flowing out of the seep

If the seep resulted from recent fill operations, investigations could occur through discussions with landfill operations to determine if specific weather conditions or placement of specific types of wastes or daily cover may have contributed to the development of the seep. Seeps that occur longer after placement of fill may involve investigating the seep area itself or obtaining liquid levels in gas extraction wells in the surrounding seep area to determine where leachate is accumulating and traveling through the landfill.

### Implementing a Solution

After investigating and identifying the seep's source, develop and implement a design solution to remediate the seep. Multiple design solutions remediate seeps, but the common concepts include:

- Preventing the source leachate from reaching the landfill problem area through improved stormwater management or implementation of synthetic liners,

Figure 1: What appear to be shadows in the images are seeps of dark leachate.

Photos courtesy of SCS Engineers.



- Collect the leachate near the seep location before it exits the landfill surface by installing strategically located dewatering points with pumps or pumps in existing landfill gas wells,
- Diverting the flow to liquid collection infrastructure installed at the landfill using interceptor trenches or toe drains to direct flow to the existing collection infrastructure,
- Preventative planning helps prevent seeps due to erosion, especially in wet landfills.

### Record Keeping

Quick detection and remediation resolve seeps before they be-

come more than a headache. Proactively monitor the situation afterward and retain detailed maintenance records to keep your operations plan up-to-date and regulators happy. | **WA**

*Daniel Ray is an Environmental Technician at SCS Engineers responsible for managing and overseeing CQA, multi-media sampling, stormwater, and compliance reporting of landfill, LFG, and composting systems for municipal and private clients. Reach him at [scsengineers.com](http://scsengineers.com).*

### References

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- [www.flrules.org/gateway/ChapterHome.asp?Chapter=62-701](http://www.flrules.org/gateway/ChapterHome.asp?Chapter=62-701)