

Double-Cased Leachate Force Main and Leak Monitoring System

Ali Khatami, Ph.D., P.E., SCS
Engineers

Landfills may add casing pipe around their underground leachate force mains to provide additional environmental protection. In the event a leachate force main leaks, the liquids stay inside the casing pipe, thus preventing leakage into the ground. Routine inspections of leachate sumps and the pumping system typically includes check for leachate inside the casing pipes to determine if there is a force main leak.

For many years, a typical leachate force main monitoring system included a dry manhole inline with the leachate force main. The term “dry” means that the leachate in the force main does not release into the manhole but instead passes through the manhole without any discharge. However, the manhole is open to the casing pipe, so any liquid that seeps into the casing pipe also seeps into the manhole. During routine inspections, any liquids observed inside the manhole could be

an indication of a leak from the force main that is releasing into the casing pipe, which, in turn, is releasing into the manhole. Inspectors also need to check that the hatch to the dry

a concrete structure at a leachate removal sump. With horizontal leachate force mains that extend between several dry manholes located at leachate removal sumps, leachate leaks that fill the nearest manhole can overflow through the casing pipe to fill adjacent manholes as well. If the problem is discovered and addressed in a timely manner, the leak in the force main can be limited to a single manhole and only the lengths of leachate force main on either side and will not extend to subsequent manholes. Otherwise, the operator must conduct a tedious investigation of all the manholes and piping to find the location of the leak.



Constructed leak detection system using a dry manhole.

manhole is properly sealed and that rainwater cannot enter the manhole.

This system requires a vertical HDPE manhole with force main connections to the below-surface manhole, as shown in Diagram 1. Photo 1 shows a system constructed with the vertical HDPE dry manhole located inside

A more recent design eliminates the dry manhole and places the casing pipe above ground. A pressure gauge or valve is attached to the flange at the end of the casing pipe, where the force main line connects to the leachate collection system risers. In this design, the casing pipe is closed and does not discharge to the outside. The leak from the force main gradually fills the casing pipe,

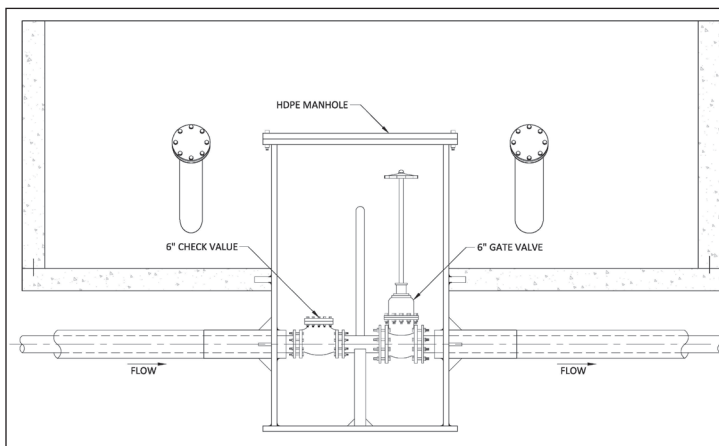


Diagram 1
Leak detection system using a dry manhole.

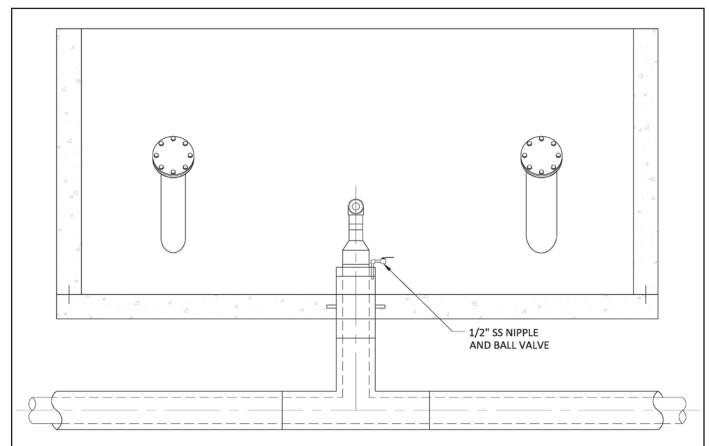


Diagram 2
Leak detection system using a valve on casing pipe.

transferring the pressure inside the force main to the liquid inside the casing pipe. Indications of a leak from the leachate force main are if either the pressure gauge shows high pressure inside the casing pipe or if you

pipe to prevent liquids from flowing beyond the closed zones. This allows the operator to pinpoint a leak zone by finding the pressure gauge with the high reading. However, note that this design creates the need for pressure



Constructed leak detection system using a valve on casing pipe.

observe liquids when a valve is open. Diagram 2 shows the recent design using a valve attached to the flange at the end of the casing pipe. Photo 2 shows the constructed system with a valve on the flange at the end of the casing pipe.

In the more recent design, once the casing pipe is full of liquid, the pressure gauges will display high-pressure readings; however, the operator will not be able to determine the exact location of the leak from the force main and will need to conduct a tedious exploration to determine the location of the leak. To narrow down the leak location zone, blind centralizers can be installed at the cell boundary locations (construction limits of cells) inside the casing

testing of the casing pipe during construction; each zone will need to be pressure tested individually, which is a tedious endeavor by itself.

Nevertheless, the recent design eliminates several cost items, including the HDPE manhole, the large gate and check valves inside the manhole, and complicated piping below surface. It also provides savings by reducing the size of the structure.

Ali Khatami, Ph.D., P.E. is Vice President of SCS Engineers. He has more than 30 years of experience in design, permitting, and construction of landfills. Dr. Khatami can be reached at akhatami@scsengineers.com or www.scsengineers.com.

Advertising Opportunities Available

It's not too late to reserve a space in the Fall/Winter issue of Talking Trash.

Job Openings

Post an employment notice on the SWANA FL website for FREE!

Email info@swanafl.org or visit www.swanafl.org for more information.