Hinkley Center Report on FlowMark Leachate Treatment

Leachate scale samples prior to installing the FlowMark submersible system in manhole number 11. The 8" gravity main collection pipe would scale completely closed in two months requiring frequent hydro-blasting and acid cleaning.

Following 22 months of FlowMark treatment the gravity main pipe remains free of scale.

******Text, Data and Comments Below are from The Hinkley Center for Solid and Hazardous Waste Management******

Justin Dacey conducted several experiments on the nature of the calcium content in leachate samples collected from the gravity system on the west side of the landfill, both upstream and downstream of the FlowMark unit at Manhole 11 prior to the start of dilution. The unit was first installed in the leachate collection system in April 2014. It is intended to prevent mineral scale accumulation by promoting the formation of microscopic seed crystals of calcium carbonate using an electrically generated catalytic effect.

Samples were analyzed for total calcium and dissolved calcium by filtering a subsample through a 0.45-micron glass microfiber filter under vacuum. Essentially, the electronic pulsed power scale control device doubled the particulate calcium compared to upstream levels (Table 2).

Table2.

		Control	**FlowMark**
Parameter	Units	Upstream Manhole 11	Downstream Manhole 5
pH	Standard pH units	7.20	7.43
Alkalinity	mg/L as $CaCO_3$	3850	3660
Total Calcium	mg/L as $CaCO_3$	5800	2200
Dissolved Calcium	mg/L as $CaCO_3$	4700	1400
Percent Particulate Calcium	%	19.0%	36.4%

FlowMark Comment on Data: Total Calcium and Dissolved Calcium have been reduced by a large amount while the percent Particulate Calcium has gone up by a large percentage. This is due to FlowMark promoting calcium precipitation in solution changing dissolved solids which normally adhere to plumbing as scale into suspended solids that do not adhere to plumbing.

This supports the claim that the device induces crystallization by precipitating microscopic seed crystals of $CaCO_3$. Although this result is from a limited number of samples, and short circuiting was observed around the unit in the channel at the bottom of the manhole (Figure 15), and untreated leachate is introduced from landfill cells downstream of the treatment unit, the data appear to show that the unit aids in forming particulate calcium.