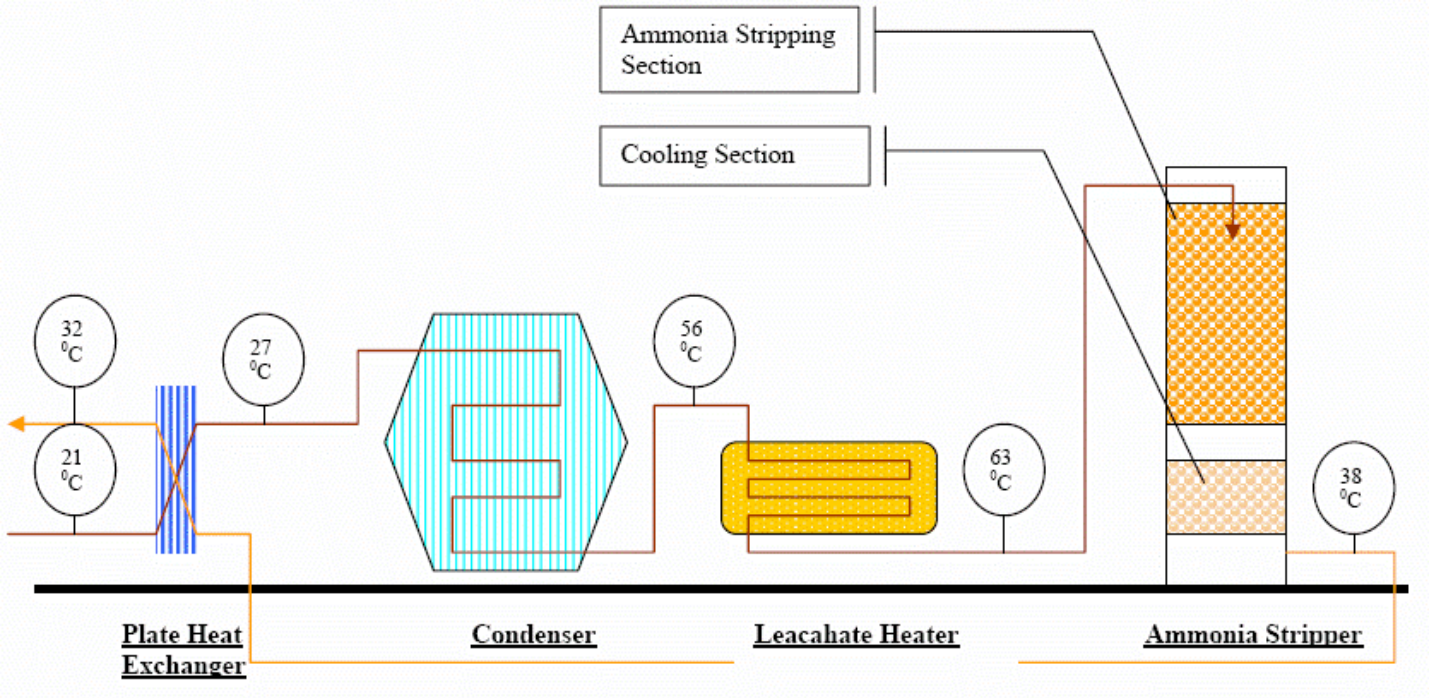
Restoration of Tseung Kwan O Landfills
Hardness Tests on Leachate from the Leachate Treatment Plant LTP2 on 11 Dec 2003

Ordinary tests:

		After buffer tank (~21°C)	After Condenser (from 27°C to 56°C)	After Stripper (the packing area) (from 63°C to 71°C)	After Cooling Section (the packing area) (from 71˜ 40°C)
Calcium	(mg/l)	41	--	19	19
Magnesium	(mg/l)	20	--	15	16
Carbonate, (mg CaCO3/L)		330	410	1,100	500
Bicarbonate, (mg CaCO3/L)		4,200	4,100	610	1,000

Filtering tests for nuclei:

Calcium	(mg/l)	<1	--	300	54,000
Magnesium	(mg/l)	1,900	--	3,100	16,000
Carbonate, (mg CaCO3/L)		<10	29,000	<10	330,000
Bicarbonate, (mg CaCO3/L)		45,000	<10	55,000	140,000



Tseung Kwan O Landfills have been fitted with Hydropath technology to minimize maintenance work on the ammonia-stripping tower and to maintain the heat exchangers efficiency.

The technology works on the principle of encouraging precipitation of dissolved solids by generating clusters of ions that acts as seed for suspended crystallization of calcium carbonate in the form of individual calcite crystals.

There are various versions of this technology for different applications. We have used the Hydropath S units to treat our steam boilers, enabling us to supply the boilers with untreated borehole water. Hydropath C units have been used on the ammonia-stripping tower and on the heat exchangers. We are experimenting with the Savastat SC-P version of Hydropath technology designed to flocculate suspended material to reduce the leachate suspended material.

The test data above clearly shows the effects of Hydropath technology. In the ordinary test, the bicarbonate starts high and the carbonate is low after the buffer tank. This changes a little after the condenser. The reason for this is that the test method dissolves any carbonate that has crystallized.

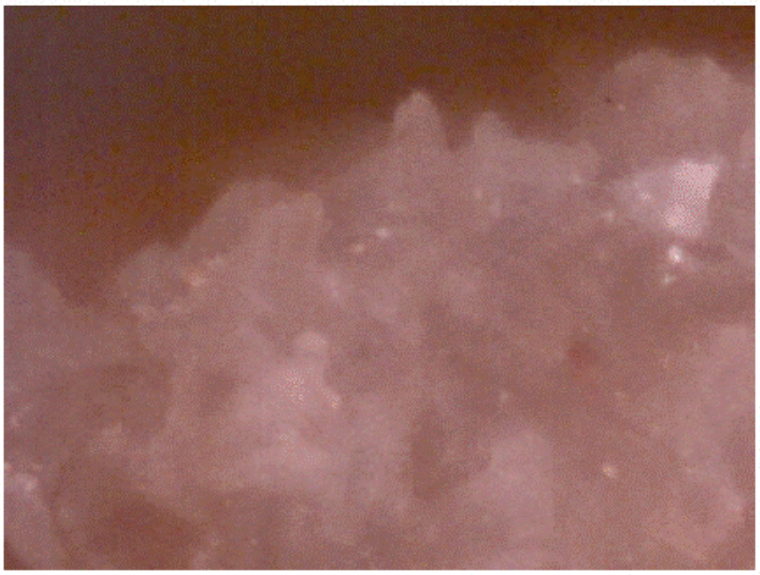
The filtering method removes the crystallized carbonate before the test and it clearly shows the effects of Hydropath. This test should be preferred over the ordinary test to clarify the effects of Hydropath technology.

The bicarbonate starts high, and the carbonate is very low after the buffer tank. This reverses after the condenser, clearly demonstrating the effect of Hydropath on suspended precipitation. If this did not occur the carbonate would be deposited on the condenser and leachate heater. After the stripper, the carbonate is minimal as it is in the form of individual calcite crystals.

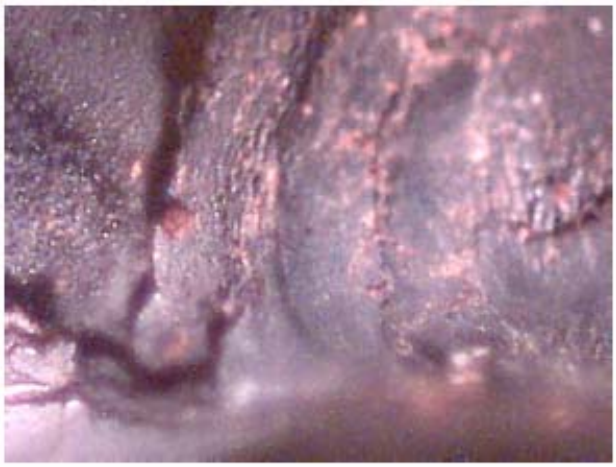
The bicarbonate increases as a result of the calcite crystallization process, CO_2 is released and some is picked up from the air. This generates carbonic acid that combines with carbonate crystals thus forming bicarbonate that is dissolved in the unsaturated water.

After the cooling the water is unsaturated and it dissolves more bicarbonate. The carbonate level is the highest as the result of the suspended calcite crystals.

After 80,000 cubic meter of leachate the stripping tower was clearly still operational. At the 1st level the packing was loose with a layer of individual calcite crystals loosely adhering to the packing.



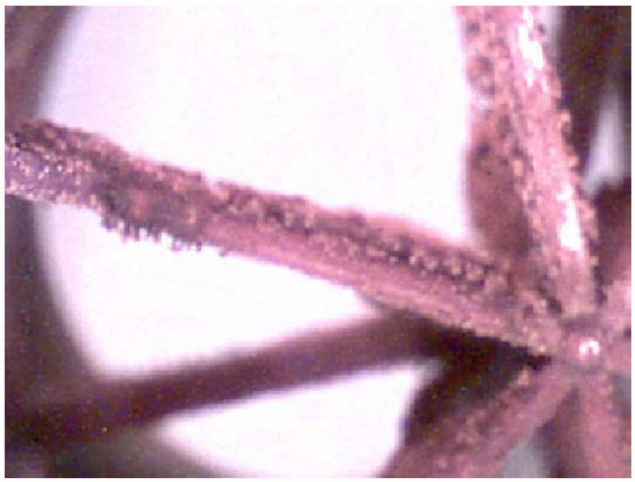
A microscope enlargement clearly shows the individual calcite crystals.



Around the perimeter of the tower some packing exhibited deposits that are clearly not carbonate. It appeared that some low temperature melting material had settled on to the packing.

In the 2nd level, the packing was clear of crystals as all the loose crystals washed off.

An enlarged picture of the surface of the 2nd level packing shows the start of fragile formation of loose calcite.



For additional information please contact:
Environmental Controls & Methods, Inc.
5594 N. Hollywood Blvd.
Whitefish Bay, WI 53217
Ph: (866) 964-0072
Fx: (866) 844-4374
Em: info@ecmi.us