

**RESEARCH & DEVELOPMENT**  
**REPORT NO. RD2077**

**Development of Alternative Method for  
Biological Foam Management at  
Shatin Sewage Treatment Works**

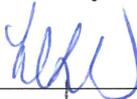
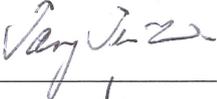
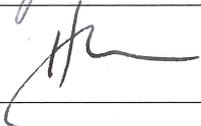
*(Final Report)*

Sewage Treatment Division 1  
Drainage Services Department

December 2014

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## Executive Summary

In winter, a long sludge age or high mixed liquor suspended solids (MLSS) level in the bioreactors is generally maintained in activated sludge treatment process to compensate for the slow growing nitrifying bacteria under low temperature. However, long sludge age would facilitate the growth of foam-causing micro-organisms such as *Nocardia*. They will accumulate on the surface of the tanks and channels to form a thick layer of foam. At Shatin Sewage Treatment Works (Shatin STW), biological foaming frequently occurs after adopting activated sludge process with nutrient removal for sewage treatment.

To mitigate the foaming issue at Shatin STW, a number of measures were adopted before. However, there was no universal way to completely resolve the foaming problem.

In 2010, self-developed foam-suppressing systems were installed at a return activated sludge (RAS) channel and a MLSS channel for trial in Shatin STW. A number of weirs were installed in each channel to trap the foam. Sodium hypochlorite solution was sprayed onto the foam surface by fine nozzles and the foaming bacteria were then killed and the foam was removed. These specific "trap" and "spray" foam-suppressing systems could effectively kill the foaming bacteria trapped on the surface while the other non-foaming bacteria in the channels would not be directly killed by the sodium hypochlorite solution. The initial result was encouraging and hence, permanent foam-suppressing systems were installed.

On the other hand, since Q2 of 2012, there were changes in operation and process control at Shatin STW. Optimizations in aeration and MLSS concentration in the bioreactors were conducted. It was observed that such optimizations tended to discourage the excessive growth of the foaming bacteria. Only little foam was found on the surface of the aeration tanks, RAS channels and MLSS channels in the last two winter seasons. Full-scale trial of the foam-suppressing systems could not be conducted after implementation of the optimizations.

In order to minimize appearance of biological foam on the surface of aeration tanks, RAS channels and MLSS channels in winter time, it is recommended to continue the reduction of aeration intensity and lowering of MLSS concentration in the bio-reactors at Shatin STW. In case persistent biological foam forms on the surface, the newly installed foam trapping and sodium hypochlorite solution spraying systems

can be put into service to remove the foam.