During 2011 Sewaco Ltd were approached by ARUP and Yorkshire Water to provide a Mobile HYRATE biofilter tower for a temporary installation at their Castleford (Wheldale) STW site.

This was used to carry out some UKWIR funded research work, in conjunction with Cranfield University, on 'The Implications of Cold Weather on Nitrification Treatment'.

Sewaco Ltd hired out one of their Mobile HYRATE biofilter tower units, to act as a Nitrifying Trickling Filter (NTF) to treat final effluent from this works having an average of 10mgNH_3-N/l.

Yorkshire Water provided a suitable concrete plinth and 2no GRP settlement tanks that were used during the trial period.

A series of track mats were used to provide a temporary access road to the concrete plinth, over the existing Type 1 track, to protect the site services beneath. These were removed after completion of the delivery lorry movements and crane activities.

The three sections of the Mobile HYRATE biofilter were delivered on the back of a 44ft lorry with an articulated flat-bed trailer. A separate 24ft lorry with a rigid flat-bed was used to deliver the ancillary equipment, i.e., pumps, pipework, feed/recirculation tank, electrical control panel, safety fencing, etc.

A 35te lorry mounted crane was used to off-load all the plant/equipment. The three parts of the Mobile HYRATE biofilter tower unit were assembled and positioned using the same crane.

The Mobile HYRATE NTF treatment plant that was delivered, installed and commissioned, consisting of:-

- A submersible Effluent Feed pump located in the Final Effluent channel (and a boxed dry spare) complete with Rotameter (variable gap meter) to measure flow.
- Duty/Standby NTF Biofilter Feed pumps + Rotameter & Duty/Standby Settlement Tank Feed pumps + Rotameter (and a boxed dry spare - as the NTF feed & settlement pumps were identical).
- A 1.2m x 1.2m x 1.4m height twin compartment lidded tank, with inlet pipework, drain valve, high level overflow and pump suction outlets. An internal weir plate complete with a flap valve was fitted to allow flow to pass (from the NTF discharge side of the weir plate) to the NTF pumped feed side of the tank for Biofilter recirculation purposes.
- 1no. Electrical Control Panel, within a green mild steel outer kiosk, and 5no float switches were used to control the various pumps.
- 1no. Mobile HYRATE biofilter tower (NTF) was erected, which held 23.3m^3 of 60° cross-flow plastic media with a Specific Surface Area of 190m^2/m^3. This was made from 3-sections consisting of a 2.4m x 1.8m Base Module with collection tray and packed with 1.8m depth. The Mid Module packed with 2.4m depth of media. The Top Module was packed with 1.2m depth of media and a HYCOVER 6-nozzle static distribution system with spreader plates.
- All interconnecting pipework, connections, valves, etc. were provided by Sewaco Ltd.
- The 2no. WPL Ltd 2.4m internal diameter circular GRP settlement tanks were provided by Yorkshire Water. Connections to and from these tanks were undertaken by Sewaco's site team.
- 1no. above ground three compartment chamber was installed for emergency overflow, effluent discharge sampling and sludge sampling purposes. All liquors leaving the trial plant were discharged by gravity back to works inlet.
- Safety (Heras) fencing panels, complete with anti-lift fixings, were placed around the temporary treatment equipment. In one section a lockable access gate was installed to prevent unauthorised access.

Two differing periods of feed flow, and associated ammoniacal nitrogen load, were applied to the NTF during the nitrification trial. For Phase 1 of the trial the following flows were used:-

Castleford FE Feed to pilot plant - 9.23 m^3/hr.

Feed to NTF - 9.5 m^3/hr.

Feed to settlement tanks - 9.23 m^3/hr.

During this period an average load of 2,215.2gNH_3-N/d was pumped to the temporary NTF unit (221.52 m^3/day at an average of 10 mgNH_3-N/l). The available surface area for biofilm growth was approximately 4,427m^2 (23.3m^3 of cross-flow media with a SSA of 190 m^2/m^3). The overall applied load to the NTF during Phase 1 was approximately 0.5gNH_3-N/m^2/d.

Once completed the feed pumps and static distribution nozzles were upgraded to allow for the higher flows being used in Phase 2:-

Castleford FE Feed to pilot plant - 19.0 m^3/hr.

Feed to NTF - 19.5 m^3/hr.

Feed to settlement tanks - 19.0 m^3/hr.

During this period an average load of 4,560gNH_3-N/d was pumped to the temporary NTF unit (456 m^3/day at an average of 10 mgNH_3-N/l). The available surface area for biofilm growth was approximately 4,427m^2. The overall applied load to the NTF during Phase 2 was approximately 1.03gNH_3-N/m^2/d.

On completion of the 14-week hire period the treatment plant units were completely drained down and left for several weeks to allow them to start drying out.

The track mats were re-laid to provide a temporary access road, for the lorries & crane, being removed on completion of these site activities. This time a 40te lorry mounted crane was used to account for the additional weight of biomass on the media.

Sewaco Mobile HYRATE biotower units are available for your temporary treatment requirement or for pilot plant trials.

These can be hired with a number of different cross-flow plastic media types, depending on the required application, namely:-

1. High Rate Filter (carbonaceous BOD removal) - with either 100 m^2/m^3 or 125 m^2/m^3 SSA media.
2. Secondary Treatment (carbonaceous BOD removal only or BOD removal/nitrification at the same time) - using 150 m^2/m^3 SSA media.
3. Tertiary nitrification - using either 190 m^2/m^3 or 240 m^2/m^3 SSA media.

Due to the modular nature of the Mobile HYRATE biotower units a number of different packed media heights/volumes can typically be provided:-

- 2.4m media depth / 10.37m^3 installed.
- 3.0m media depth / 12.96m^3 installed.
- 3.6m media depth / 15.55m^3 installed.
- 4.2m media depth / 18.14m^3 installed.
- 4.8m media depth / 20.74m^3 installed.
- 5.4m media depth / 23.33m^3 installed.

Please contact Sewaco Ltd for more information and to discuss your temporary treatment requirements in more detail.