

Anglian Water (AWS) has selected the Proam ammonia monitor to provide continuous ammonia measurement on final effluent discharge where accurate and reliable measurement is required.

One of the most recent installations is at Stanningfield WwTW situated near Bury St. Edmunds, in Suffolk. This is a small rural site receiving primarily domestic sewage. The site performs aerobic treatment in a surface aerated ditch to remove ammoniacal-nitrogen before discharging to a local water course.



Stanningfield WwTW

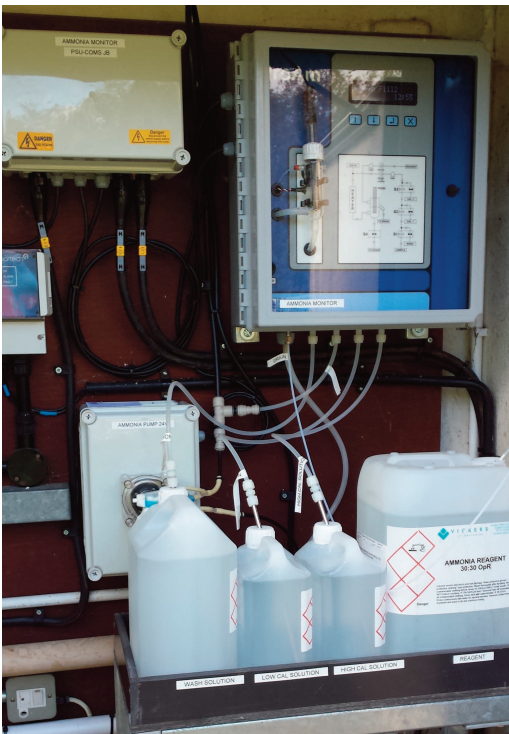
Stanningfield WwTW will be subject to a new consent, imposed at 3.00mg/L NH₄-N so a Proam Ammonia analyser (and temperature probe) has been installed in advance to profile the discharge. Historically, regular spot sample analysis has been used to verify site treatment but discrete measurement can only provide a snapshot of ammonia concentration at any one time. The Proam reports continuously, building a comprehensive picture of site performance and effluent quality. The effect of peak loads entering the works, cold weather influencing the nitrification process and heavy rainfall events, can all be properly evaluated. This information can be used to determine any site improvement required during the design of remedial works.

The installation at Stanningfield WwTW was commissioned during June 2015 and immediately started to provide useful data. The Proam identified that when high rainfall occurs, the increased flow initially causes a slug of high strength influent to enter the works. This paradox is important since high rainfall would typically be associated with dilution and reduced load entering the treatment works.

Selecting the correct instrument for compliance monitoring

The reason why an analytical technique was selected for the installation at Stanningfield WwTW was primarily for two reasons.

Since the consent would be at 3.00mg/L NH₄-N, there was a need to maintain the best accuracy possible at low concentrations. Ion Selective Ammonia (gas sensing) methods respond specific to the ammonia concentration and can be automatically calibrated against two known calibration solutions, to maintain the optimum measurement accuracy. Any calibration drift should it occur, can be automatically compensated for. Additionally, the calibration sequence is used to validate the performance of the instrument and raise diagnostic alarms, output to telemetry to identify when the instrument needs to be serviced. This diagnostic information is critically important, providing the end user with a greater degree of measurement confidence.



Ion selective probe technology mounted directly in the final effluent chamber using an ammonium ISE does not have the functionality to automatically calibrate to compensate for calibration drift. Regular site attendance would be required to perform manual calibrations. Any calibration drift would be significant relative to a very low consent of between 2.00 and 3.00 mg/L. The ammonium ISE technique is also affected by other dissolve ions especially potassium. The potassium concentration may vary considerably dependant upon geology, industry, saline intrusion in coastal locality, surface water runoff and storm flows causing dilution.

The Proam had been identified as fit for purpose

The Proam ammonia analyser had been evaluated during two comprehensive site based trials conducted on final effluent (at Worcester WwTW) and monitoring liquors (Wanlip WwTW). The evaluations were partly funded by Anglian Water and conducted by WRc (the Water Research Council). The instrument proved to be very reliable in operation and provided good measurement data during both trials giving the end user a high level of confidence that the instrument was fit for purpose.

Making the Proam installation

The cost of making an installation can sometimes be minimised. When PPM surveyed the site, there was an opportunity to use an existing GRP kiosk to house the instrumentation and keep installation costs to a minimum. Additionally, since the final effluent chamber was located immediately beside the enclosure, it was decided that the sampling system could also be simplified. The membrane panel (filtering all solids and biology above 0.45 micron) would be installed directly in the final effluent chamber mounted off a bespoke hanging bracket. A small peristaltic sample pump, over-pumping filtrate to the analyser would maintain a constant supply of filtrate for analysis. A small reservoir of filtrate would also be provided to allow the instrument to purge itself after the automatic acid cleaning cycle and after automatic calibration.

Instrument maintenance

Since the sample is pre-filtered to remove the suspended solids and biology, the maintenance on the instrument is significantly reduced. Essentially, the instrument requires monthly attendance to replenish reagent, cleaning solution and change calibration standards. The filter is also cleaned on a monthly interval. PPM provides a service contract to support the installation releasing AWS from these duties.



For further information on the design of this system please contact:

Steven Tuck
Pollution & Process Monitoring Ltd
Bourne Enterprise Centre
Borough Green
Kent TN15 8DG
Tel: 01732 882044
Mo: 07970 140842
Mail: s.tuck@pollution-ppm.co.uk