

Example of Management of Nitrogen Removal in a Night Soil Treatment Plant, using the On-Line Total Nitrogen Analyzer TN-4100

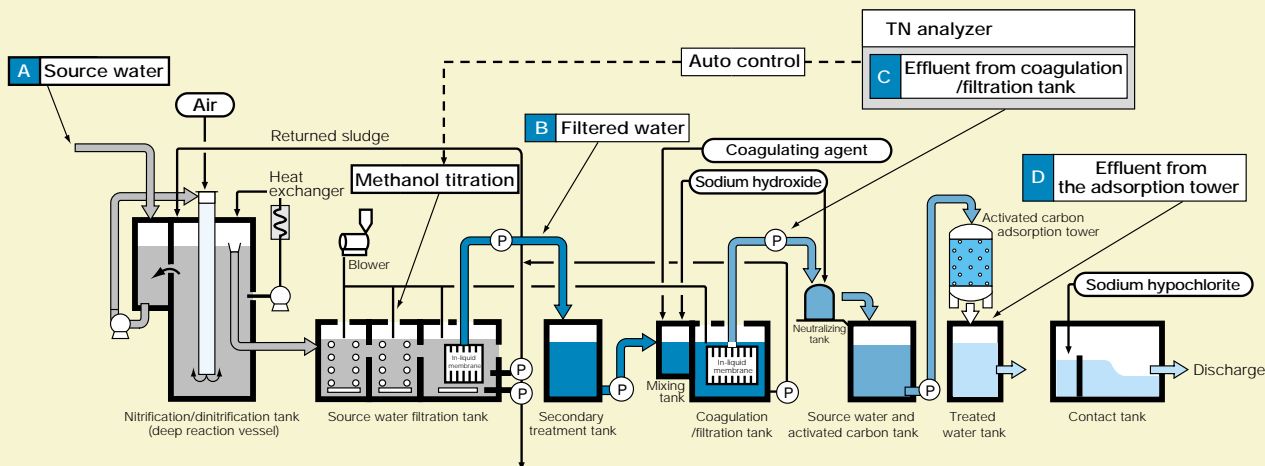
To prevent eutrophication of closed water areas, agreements with industry have been established which regulate environmental standards, discharged water standards, and type of water area specifications with respect to nitrogen. In addition, it is expected that water discharge controls with respect to total nitrogen (TN) will be reinforced. Devices for measuring TN has been developed, the Shimadzu On-Line Total Nitrogen Analyzer TN-4100 and Total Organic Carbon/Nitrogen Analyzer TOCN-4100.

Here we would like to introduce the features of the TN-4100, and the results achieved when this is used to manage nitrogen removal at a night soil treatment plant.

Outline of a night soil treatment plant

The TN-4100 is installed in a night soil treatment plant, such as the one shown in the figure below (see Fig. 1 for location of the device).

- Processing method: Membrane separation high load biological nitrogen removal system (membrane in liquid) + Advanced treatment (coagulation/filtration (membrane in liquid) + adsorption to activated carbon)
- Scale of treatment: 130kL/day (excrement: 90kL, septic tank sludge: 40kL)



Measurement point	A Source water	B Filtered water	C Effluent from coagulation /filtration tank	D Effluent from adsorption tower
TN concentration	1000ppm	18ppm	8.0ppm	4.9ppm

Fig. 1 Flow line diagram of night soil treatment

Application of TN Measurement Results in Controlling

Based on the measurement results of the TN-4100, the amount of added methanol is controlled so that a TN concentration of equal to or less than 10ppm after dinitrification is maintained. (A few ppm of TN is removed at the next stage, the activated carbon treatment, so the final discharged water has approx. 5ppm of TN.)

The results are shown in Fig.3. With this device used for controlling the amount of methanol addition, the TN concentration following dinitrification has been stabilized at approx. 8ppm.

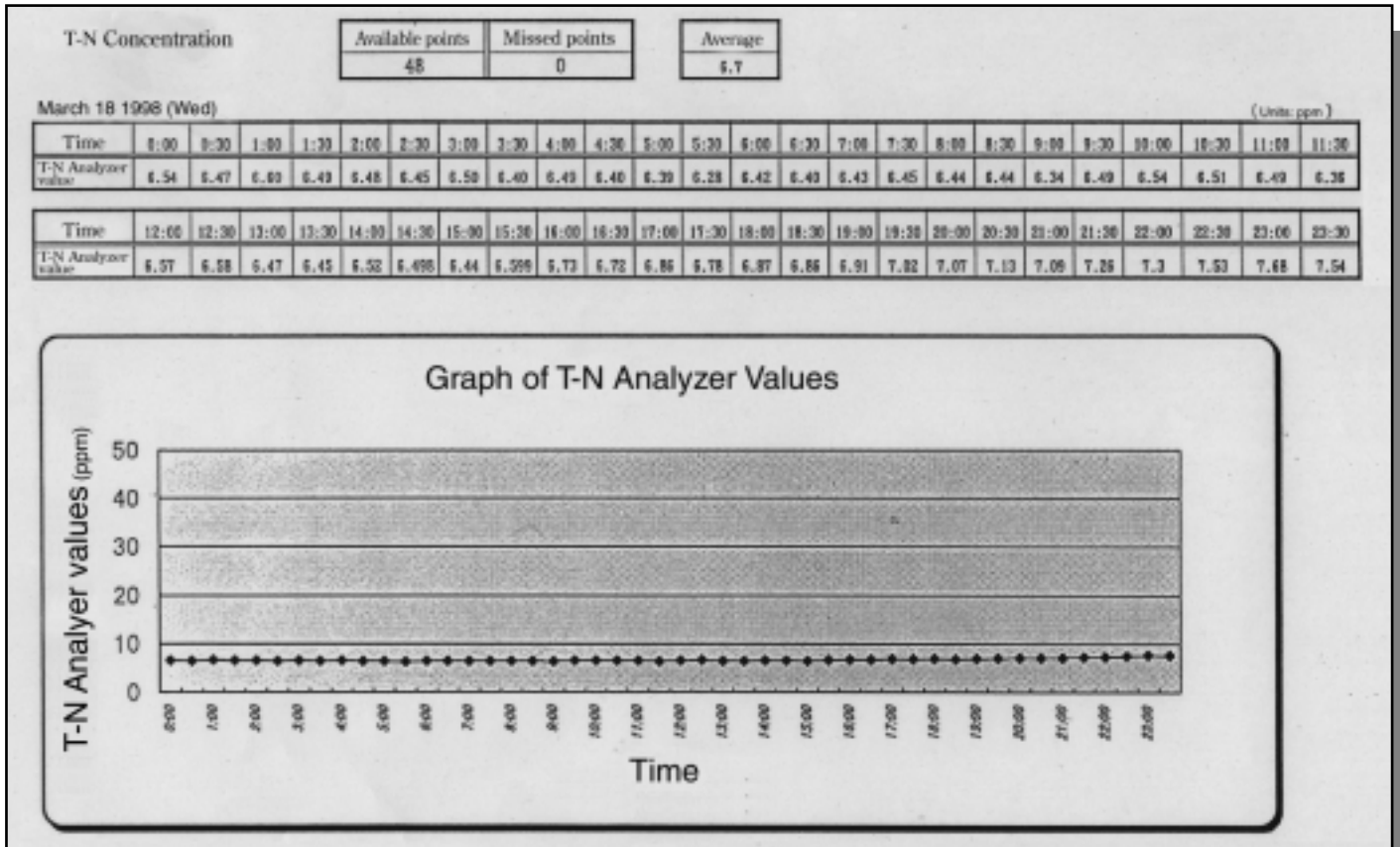


Fig. 3 TN measurement values after controlling amount of added methanol

Benefits

Using the Shimadzu On-Line Total Nitrogen Analyzer, the following results are achieved:

- Feedback control is possible, and the amount of methanol added is optimized leading to a reduction in the amount used by 30 - 40%. This is a cost saving of approx. 500,000 yen/month;
- Reduction in cost of manual analysis;
- Maintenance of a satisfactory level of quality in the discharged water;
- Data proving level of water quality is automatically preserved;
- Abnormal water quality can be immediately dealt with.

Applications of the TN Analyzer

- Controlling nitrogen removal processing (the current application)
- Surveillance of discharged water
- Self-management of TN concentration regulation
- Improvement in accuracy control of measurements and surveillance according to ISO14001 environmental management systems

Features when using TN-4100/TOCN-4100

- The TN-4100 allows auto-switching of up to six flow paths.
- Management of any points between source water and the final discharged water is possible, because of the auto-switching function that allows measurements of flow paths with widely variable TN concentrations.
- The TOCN-4100 enables simultaneous measurements of TN and TOC, widening the range of applications in monitoring and control. (The TOCN-4100 allows a maximum of three flow path switches.)
e.g. Monitoring of the amount of organics (TOC) prior to nitrification

Rapid and accurate measurement of total organics and total nitrogen in water

Shimadzu On-Line Water Quality Analyzer

4100 Series

TN-4100

TN measurement

TOCN-4100

TOC & TN measurement

TOC-4100

TOC measurement



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