3D TRASAR™ Technology Improves Return of Boiler Condensate at Pharmaceutical Plant in Northern Europe

NALCO Water
An Ecolab Company

CASE STUDY – FOOD & BEVERAGE

CH-1290E

INTRODUCTION

Modern pharmaceutical companies naturally wish to operate both efficiently and in a way that is sustainable. A global, market-leading pharmaceutical company that operates a manufacturing plant in northern Europe has a goal of reducing its greenhouse gas emissions by 20% by 2012, and of reducing water use by 2% annually.

In a typical factory, the boiler house supplies steam to many areas of the plant and all utilities engineers will be aware that as much steam condensate should be returned as possible, as it contains valuable heat energy as well as saving water. In all factories, condensate return varies depending on the end use for the steam, but the amount of condensate that can be returned to the boiler house is also dependent on the quality of the condensate. Returning contaminated condensate can cause considerable problems with boiler operation. In particular, organic contaminants can break down to organic acids causing severe corrosion. These contaminants may also cause foaming and priming in the boiler, leading to faulty boiler level control operation and poor quality steam.

In this particular factory, occasional contamination with glycol from a chilled water circuit had resulted in condensate from the organic synthesis plant being permanently discharged to drain.

WHAT WERE THE CUSTOMER'S GOALS?

The customer wished to have a reliable, on-line method of detecting contamination of the condensate so that it could be returned to the boiler house when it was of suitable quality and dumped

ENVIRONMENTAL INDICATORS — eROI℠ — ECONOMIC RESULTS

Reduction in fresh water demand of 6,000 m^3 (12%) per year due to reduced boiler make up

WATER

Annualised savings in water costs of over €11,800 per year

Overall reduction in energy demand over 530,000 kWh

Elimination of 100 tonnes of greenhouse gas emissions through advanced treatment technology

All data verified by the customer

ENERGY

Annualised savings in energy costs of over €19,100 per year

Overall reduction of Total Cost of Operation (TCO) equivalent to over €30,000 per year

eROI is our exponential value: the combined outcomes of improved performance, operational efficiency and sustainable impact delivered through our services and programs.

when contamination was occurring. The customer had investigated various possible methods such as on-line Total Organic Carbon (TOC) monitoring but found that they all had disadvantages. Some were either too slow to react, or could only perform tests at intermittent intervals, using significant quantities of expensive reagents. Others had too high capital cost or were designed for a laboratory environment only.

The customer then asked Nalco Water to investigate and come up with a solution that could overcome these draw backs.

ACTION PLAN

A survey of the system was made and samples taken for analysis. From this analysis it was determined that the presence of the glycol water in the condensate could most easily be detected by adding an inert fluorescent tracer to the glycol circuit and monitoring for its presence in the condensate flow from this area of the plant.

Using the fluorescence technique has a number of advantages. A fluorescent tracer can be selected that has an excitation and emission wavelength that is very different from any background fluorescence that might be present in the system ensuring that there are no interference effects that could be significant. The fluorescence signal can be readily detected by a Nalco Water 3D TRASAR system, which monitors the system continuously without the need for expensive reagents and with minimal maintenance requirements.

The site added a Nalco Water tracer chemical to the glycol circuit and installed a Nalco Water 3D TRASAR monitoring unit on the condensate return line from this area of the plant. An output from the system was configured so that if the level of the tracer in the condensate goes above 5 ppm a signal is sent to the control room which automatically triggers a dump valve to open to protect the boiler from contaminated condensate (as shown in Figure 1). This ensures that, when there is a very minor level of contamination that is acceptable, the condensate is still reused in order to save energy and water. When the contamination is significant, the condensate is dumped until the level returns to more normal conditions.

Figure 1 – *Detecting ingress of contamination in condensate*

The detection level of the TRASAR unit was tested by injecting a diluted solution of the chilled water that contained 0.0035% glycol (as shown in Figure 2). The peak reading was 14.4 ppm of TRASAR. The trigger level for the dump valve was set at 5 ppm, 34.7% of this peak. So, the trigger level equates to a detection level of 0.0012% of glycol in the condensate, showing that the TRASAR system can successfully detect very low levels of contamination.

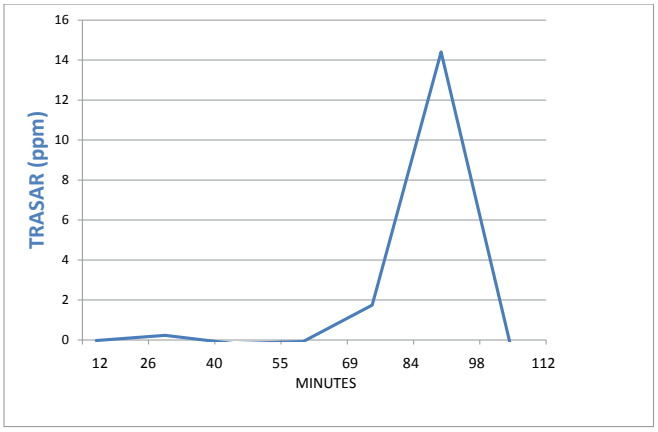

Figure 2 – *Response to a solution containing 0.0035% glycol*

RESULTS

As a result of installing this system the plant was able to recover 6,000 m^3 of condensate per year that would otherwise have been dumped. This reduces the water consumption of the boiler plant by the same amount.

The heat content of this condensate is 533,000 kWh per year. Or put another way, this equates to a reduction in carbon footprint of nearly 100 tonnes per year.

In total, the customer was able to report a reduction in total cost of operation of over €30,000 per year.

CONCLUSIONS

Condensate is sometimes dumped rather than returned to the boiler house. The original reasons for dumping this valuable source of heat energy may still be valid, but with modern, innovative techniques such as Nalco Water 3D TRASAR technology, some or all of that condensate may be recoverable at reasonable cost. So, the possibility to improve condensate return should be reviewed on a regular basis. This enables the plant carbon and water footprints to be reduced, improving sustainability performance and lowering total cost of operation.

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