

# Easier and faster lab analysis in power plants

## Problem

New water analysis solution needed for the parameters silica, phosphate, iron, pH and conductivity.

## Solution

The decision was taken to upgrade to a DR 3900 Spectrophotometer.

## Benefits

Increased reliability, traceability and ease of use with new instrumentation.

## Background

A power plant customer has recently upgraded their spectrophotometer solution.

The Combined Cycle Gas Turbine (CCGT) power plant was built in 2002 and operates with a varied running regime depending on market conditions and grid requirements. This includes 24 hour running at base load and two shifting for short duration periods as little as 4 hours.

When the plant was built it was equipped with a suite of analytical instrumentation, both lab based and in-line.

A DR 2000 Spectrophotometer from HACH LANGE was used to run ultra-low range (ULR) silica, phosphate and low range iron. Chemical analysis of the process water begins around 24-36 hours after start-up to allow early matrix fluctuations to settle, after that the water is analysed 3 times per week.

The Operations Manager explains why these parameters are analysed:

“**Silica** levels higher than 20ppb in the steam can cause the turbine blades to erode, like sandblasting over time. This can be catastrophic to the blades. Equally, if silica is present in the boilers it can cause hotspots which will ultimately lead to tube failure. If levels are detected at 20ppb and above, a straightforward blow down will minimise the risk.



**Phosphate** is dosed to the treated feedwater to create a protective passivation layer inside the boilers. This inner layer protects the boilers from potential damage due to low acidity and oxygen pitting.

If the phosphate levels are not correct in the feedwater then it puts the boiler at risk of damage which ultimately could cause plant shutdown.

**Low level iron** monitoring is analysed in the boiler water as it gives an insight into potential erosion of iron piping. Iron had previously been found in the feedwater which, upon investigation, highlighted a pipe-elbow that was being eroded by water flow. If this had not been spotted it would have eventually led to a breakthrough.

**Conductivity** and **pH** are also analysed to ensure that the correct dosing of ammonia and phosphates are made to control the pH in the boiler.”

### Site / Plant

- Built in 2002 and classed as a CCGT (Combined Cycle Gas Turbine) power plant.
- The plant is equipped with a suite of analytical instrumentation both lab based and in-line.

### Solution and Improvements

After being in use since 2002, the Spectrophotometer (DR 2000) supplied at the plant commissioning had reached the end of its life and was in need of replacement. The Operations Manager explains:

“We had used a HACH LANGE spectrophotometer since the plant was opened and it had never let us down. It was a natural choice to seek a new HACH LANGE replacement to ensure that the critical chemical parameters were monitored accurately and reliably. Our HACH LANGE Representative came to site to offer guidance and advice on a new spectrophotometer and we evaluated the new technological improvements on offer.”

HACH LANGE supplied a new DR 3900 Spectrophotometer that used the same methods as the original DR 2000. The ULR silica method has seen an improvement in final photometric evaluation due to the replacement of the old manual flow cell and the introduction of the automated sipper cell module (SIP 10).



*DR 3900 spectrophotometer with automated sipper cell module*





### Service included

Following delivery HACH LANGE were able to offer a full training and implementation support network as well as a Comfort Maintenance Agreement on instrumentation ensuring that an annual inspection and calibration are carried out as well as access to a support hotline in case of issues.

### Conclusion

The customer concludes, "we've had HACH LANGE instrumentation from the beginning and it's always been well supported and reliable. We've always found them to be good quality instruments with excellent after-sales support. Initial methodology teething problems were overcome quickly with the expertise and experience of both the Sales and Technical Support Team".

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## Benefits

- The new automatic sipper cell has vastly improved the analysis process. It is easier, faster and offers an improved repeatability of testing.
- The ease of result trending and traceability in the new DR 3900 are big improvements on the previous model.

## The solution: DR 3900 VIS Spectrophotometer

The DR 3900 spectrophotometers are engineered to achieve exceptional analytical accuracy with an easy and transparent working process.

### High laboratory efficiency

More than 220 pre-programmed analysis methods directly available. Rapid data updates via RFID technology by simply holding the cuvette test box in front of the spectrophotometer and it's done.

### Highly accurate, reliable and traceable measurements

Samples can be traced back to the sample location using RFID technology, including all relevant information such as the sample location, sample taker, date and time. The expiry date of chemistry is automatically monitored during analysis for reliable results.

### Quality assurance

Batch certificates are available instantly via the cuvette test box and RFID for accurate adjustment of lab/process measurement values.



## Ensure continuous operation with flexible service contracts

Whether a power plant operates 24 hours a day, 7 days a week or comes online to meet peak demand, there are unique challenges to monitoring the water quality in the steam cycle and waste water at your facility.

HACH LANGE Service can help you with your maintenance and support challenges ensuring flawless operation and reliable results.

HACH LANGE offers flexible service contracts to fit your needs, including the option to extend the warranty for up to 5 years!