

## Tradebe Healthcare National Limited

### Review of Temperature and Process Control at the Wrexham Incinerator

#### Environmental Permit WP3836ZF

23<sup>rd</sup> October 2015

#### Summary

An issue was identified with the temperature being recorded by the CEMs (Continuous Emission Monitoring) temperature probe. The temperature measured was significantly higher than the actual temperature.

The CEMS temperature reading has no feed back to the incinerator or abatement and is not used in any way to control the process. The only impact that it could have had was to incorrectly and artificially increase the particulate matter measurement once corrected to reference conditions.

The CEMS temperature probe has been attended to by the service provider and is now reading correctly.

#### Background

An issue was identified with the temperature being recorded by the CEMs (Continuous Emission Monitoring) temperature probe.

The temperature measured was significantly higher than the actual temperature and it was recording above the expected temperature of below 160 °C and as high as over 400 °C.

Temperature of the gas stream is extremely important throughout the process as it must be maintained above 850 °C or 1000 °C in Stage 2 (Secondary Chamber), depending on waste type, to comply with the permit. The temperature then has to be reduced before the abatement section of the plant. This is in order for the abatement reagents used in the Flue Gas Treatment (FGT), including lime and carbon to be effective and also to protect the filter bags used as part of the FGT from thermal damage or even combustion.

There was concern that if the CEMs temperature was reading correctly, the temperature in the abatement system prior to the stack would be too high for it to work efficiently, potentially leading to emission breaches. There could also be an effect on the reference correction factors for the parameters monitored by the CEMS.

#### Investigation

### Temperature Measurement

The incinerator at Tradebe's Wrexham facility does in fact use multiple temperature probes on a continuous readout and control basis. The single CEMS temperature probe has no feed back to the Incinerator or FGT and is not used to make any decisions.

The incinerator has a series of probes throughout as follows:

Area of plant	Number of temperature probes
front of kiln	3
ash chamber	2
secondary chamber	4
boiler	4
reactors	3
bag house	1
flue gas	1
stack	1
Total	19

The temperatures from the process control probes are not logged on site but are displayed real time at the control station.

These probe monitor temperatures throughout the system and are used in process control to ensure the incinerator operates at the correct temperatures.

The probes control the process as follows;

If the temperatures recorded in the secondary chamber are not within the range 850-1200°C then the process stops loading waste;

If the temperature probe in the baghouse reads above 135°C then the flue gas exchanger uses post FGT flue gas to keep the pre FGT flue gas below 160 °C

If the temperature in the boiler outlet is recorded as above 400°C then the ERV (Emergency Relief Valve) is operated;

If the temperature recorded in the reactor is above 190°C then again the ERV is operated.

Because of the control measures in the system it was concluded that the temperature recorded by the CEMS probe must be incorrect as the ERV would have been operated prior to this (see above) and potentially the filter bags in the bag house would have ignited.

### CEMS Probe

The CEMS probe has been indicating incorrectly elevated temperatures since at least January 2015. The service provider was asked why this was never picked up during routine maintenance and the service provider's response is below;

*Your (Tradebe, Wrexham) probe was actually displaying a reading, which was reported as too high. Unfortunately the engineers we employ visit many different plants and the temperature that was seen is normal for some of the gasification processes we work on. These are WID based systems like yours. If the probe had been showing no readings or a fault it would have been picked up straight away.*

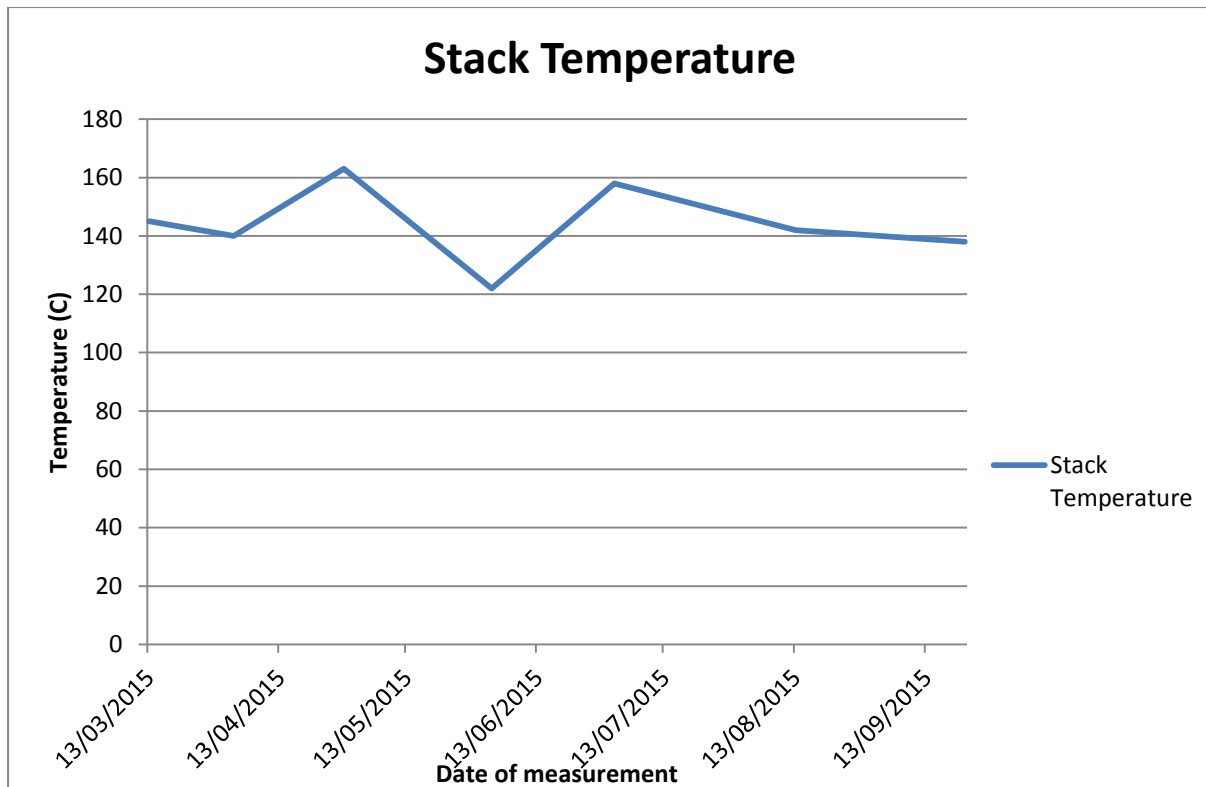
The CEMS temperature probe is not part of the process control mechanism. However it is used for the correction of the particulate matter data. Advice from the service provider is that the effect of this would be to give higher readings than the actual reading therefore there would have been no risk of under reporting of breaches. As a consequence, it means that any breaches of particulate matter reported during this period may not have been actual breaches.

### Temperature Confirmation

There is no logging of the process temperature probe's readings to be able to demonstrate to the Environmental Regulator that the process temperatures are as expected and under control, and not actually at the elevated temperatures indicated by the faulty CEMs probe.

However, as part of the periodic monitoring conducted on site, temperatures of the stack are measured and recorded independently by the accredited stack emissions monitoring contractor and recorded.

Inspection of the readings recorded for 2015 so far, give the following true temperature readings which are within normal operating conditions.



It can be seen from the Stack Temperature graph that in one instance, the temperatures are higher than the 160 °C temperatures that the abatement system should be controlled at. This is because the temperature probe is after the flue gas exchanger and the flue gas is re-heated prior to release.

## Conclusion

The conclusion from the investigation is that the CEMs temperature probe was faulty and that the fault was not identified for several months. The fault was not identified as the CEMs temperature is not recorded, is not used for any process control function and is not used to make any decisions.

The CEMS temperature probe fault has not affected the operation of the process which is controlled by the other probes in the system.

The incorrect reading from the CEMs temperature probe only had the potential to impact the particulate matter parameter. The incorrect reading from the CEMS probe has also not lead to the under reporting of potential particulate breaches.

There has been no potential to cause any significant pollution and there in no basis to make any notification to the Environmental Regulator under condition 5.1.1 of the Environmental Permit.

In order to prevent reoccurrence of an incorrect temperature probe reading going unnoticed a document will be produced with the expected temperature range for each probe, including the CEMs temperature probe, will be issued and trained to the relevant staff.