



Identifying false readings of exhaust gas monitoring equipment

An increasing number of vessels have encountered port state issues due to exceeding sulphur emissions limits caused by inaccurate readings in scrubbers and exhaust gas cleaning systems.

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Crew members may not be experts in sulphur and carbon dioxide emissions monitoring systems and may struggle to correctly interpret measurement signals and analyser readings. In a recent article, DNV discusses the importance of calibration and maintenance routines, and how to identify false reading from the monitoring equipment.

Report malfunctions

False readings lasting more than one hour should be reported to the flag administration and the relevant port state administration. However, sometimes a malfunction may go undetected because the monitoring equipment does not register any increase in Sulphur Dioxide concentration. Often, the cause of false measurement readings is poor maintenance.

Failure to report malfunctions may lead to:

- **Regulatory penalties**

: Non-compliance with reporting requirements can result in fines and other penalties from regulatory authorities.

- **Operational delays:**

Undetected malfunctions may cause unexpected port state issues, leading to delays and additional inspections.

- **Environmental impact:**

Inaccurate readings can result in higher emissions, negatively impacting the environment and potentially causing harm to marine life.

Be alert to inaccuracies

To ensure accurate monitoring and build confidence in making the right decisions when faced with suspicious measurement results, DNV recommends:

- Always be alert to zero or negative Sulphur Dioxide values over extended periods and perform quick plausibility checks. Zero and negative Sulphur Dioxide readings do not necessarily indicate a failure of the analyser. Given the allowable calibration accuracy tolerance of $\pm 2\%$ of the lowest measurement range used, negative readings may still be considered within the acceptable range of the analyser's zero setting. Thus, very low concentrations at in-service measurements may be displayed as zero or even negative. The most effective fault finder is the crew's experience, which enables a quick assessment of whether the monitored scenario is realistic.
- The following observations are strong indicators for inaccurate zero readings:
 - Irritating odour in the exhaust plume, sometimes with eye irritation.
 - No or very little fluctuations in the measurement readings even after adjusting the wash water flow; measurement readings may drop even further into the negative range after increasing the wash water flow.
 - CO₂ readings below 5%.
- The use of fuel with a high sulphur content should result in noticeable SO₂ concentrations in the cleaned gas. Usually, the gas analysers perform regular self-checks which identify

system malfunctions or irregularities. However, it is important to frequently check the device's error messages.

- If the analyser is suspected of showing false readings, follow the manufacturer's recommended corrective actions to identify any malfunctions.
- Other systematic mistakes could occur during the calibration process, such as:
 - Potential pitfalls range from deviations from the described procedure to the use of calibration gases with component concentrations that differ from pre-settings in the analyser's calibration routine.
 - Also, repeated forced zero adjustment during the zero-point setting with low Sulphur Dioxide readings can shift the zero reference over time, reducing measurement sensitivity in the low concentration ranges.
 - Recorded values may also differ from local display readings if the sensor signal is not aligned with the specified measurement range setting in the control and monitoring system.
- The removal of SO₂ in the emissions monitoring system may be caused by the cooler. If measures to prevent SO₂ losses are not correctly applied, this can result in false lower readings.

Gard recommendations

It is crucial for ship owners, ship managers, and suppliers to accurately identify and report false readings in exhaust monitoring equipment to avoid regulatory penalties, operational delays, and environmental impact. This involves following requirements and best practices to maintain accurate exhaust gas monitoring and avoid false readings, ensuring that maintenance and calibration schedules for exhaust monitoring equipment are adhered to, and training all crew members to recognize and report false readings promptly.

We thank DNV for permitting us to share this information with our readers. The original version of this article, with more detailed technical recommendations can be found on the [DNV website](#) and related [DNV technical and regulatory news - No. 25/2024](#)