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Subject: Comments and recommendations regarding the proposed modifications in the Norwegian regulation for off-shore operators

#### Background:

Emission Care is an accredited stack testing company, with operations in Netherlands and Norway. We are building and maintaining PEMS for operators in the chemical / oil and gas and power sector in both countries. We perform stack tests to collect PEMS data and to validate the models.

Arend Smit, director of Emission Care, is the chairman of the EU working group designing the Technical Specification for quality assurance of PEMS, CEN/TS 17198. He will be happy to assist you in explaining the technical details of our recommendations (også på norsk)

#### Comments:

All comments and recommendations given below relate to the proposed modifications for the monitoring of NO<sub>x</sub> emissions.

1. The proposed modifications lack details with respect to requirements for the stack testing and the interpretation of the collected stack test data. For example: the duration of the individual stack tests are not defined. The calculation methodology to be used to compare stack test data and data collected from the plant monitoring equipment is not defined.
2. The proposed regulation prescribe a stack test covering minimum and maximum capacity of the plant. This requirement can negatively influence the production capacity of the operator, adding to the cost of the stack test. Moreover, capacity is not always the most important parameter to be varied during a stack test: the objective is to vary the emission from minimum to maximum during the stack test. This can often also be achieved when varying other parameters.
3. The uncertainty requirement of 15% is low and will be increasingly difficult to meet when the emission performance of the sources is moving down (low NO<sub>x</sub> turbines). The EU standards use an uncertainty requirement of 20% and continuous monitoring equipment in on-shore installations in Norway is also bound to an uncertainty requirement of 20% (see forurensningsforskriften del 7). Please note that the uncertainty of the accredited stack test is often around 10% and will go up rapidly if the homogeneity of the stack gases is poor and when the absolute emission levels are low.
4. The proposed regulation provides different actions, based on the calculated uncertainty of the plant monitoring equipment:
  - uncertainty < 7,5% = no action
  - uncertainty > 7,5% and < 15% = calibrate monitoring equipment with a calibration function
  - uncertainty > 15% = repair monitoring equipment.

We have three comments:

- The calculation methodology (for the uncertainty test + the determination of the calibration function) is not defined.

- The approach is not in line with EU standards and therefore different from the approach of the Norwegian on-shore installations with continuous monitoring. The on-shore installations with continuous monitoring shall follow EU standards .

- Last but not least, the proposed regulations do not provide requirements for testing of the repaired monitoring equipment.

5. Quality assurance of continuous monitoring equipment, according to EU standards, is based on 3 quality assurance levels (QAL) and an annual surveillance test (AST):

QAL 1 = initial proof that the equipment is suitable for the monitoring task

QAL 2 (+AST) = comparison against a standard reference method (stack testing)

QAL 3 = regular check's by the operator on the performance of the monitoring equipment

QAL1 is not mentioned in the proposed regulation. QAL 2 is covered in the proposed regulation (stack testing requirements). QAL3 is only covered for PEMS in the proposed regulation (sensor validation system), but not for CEMS.

#### Recommendations:

We recommend to follow the same approach for continuous monitoring on off-shore locations as for on-shore locations (see §31.6 sub (8) of forurensningsforskriften): use the EU standards/technical specifications for quality assurance of CEMS and PEMS. We suggest to specify the standards: EN 14181 / CEN/TS 17198 / standard reference methods for NO<sub>x</sub> and O<sub>2</sub>.

Due to the relatively high cost involved with stack testing on off-shore locations compared to on-shore locations, a relaxed testing scheme (once per 3 year instead of yearly) can be agreed. Please provide the duration of the stack test.

We recommend to use the same uncertainty requirements for on-shore and off-shore continuous monitoring systems (NO<sub>x</sub>=20% @ 95% confidence interval).

We recommend to also use the same calculation methodology described in EN 14181 and CEN/TS 17198 to determine whether a device meets the required uncertainty (QAL1) and passes the variability and validity tests using a 20% uncertainty.

We recommend to always use a calibration function in line with EN 14181 for CEMS. In case a CEMS fails to pass the AST, the CEMS shall be repaired and retested (new stack test required). In case a PEMS fails to pass the AST test, the PEMS shall be repaired. The PEMS can be retested with stack test data from the failed test if this data is not used to repair the PEMS. Otherwise, a new stack test is required.

Please note that CEN/TS 17198 requires adaptation of the PEMS if the variability and validity tests fail. A calibration function shall not be applied. This approach can be followed for PEMS, but the use of a calibration function to correct the PEMS can also be considered.