KW3 EMISSIEMETINGEN

Report: KW3-20200099R01

Emission measurements on the Prospector 1 platform of Borr Drilling

Client number : **102791**
Location : **Prospector 1**
Att. : **Adjiedj Ashikali**

Date	Revision	Author
21-10-2020	0	A. van Meekeren

SUMMERY

On 13 October 2020 KW3 B.V. has performed emission measurements on six diesel generators which are placed on the Prospector 1 of Borr Drilling. The measurements were performed for Borr Drilling. The air measurements were performed to establish the following components;

- NO_x, O_2;
- NH_3.

The objective of these measurements was to determine the emissions during representative operation of the following installation:

Diesel engine 1, 3516C-HD PES00424
Diesel engine 2, 3516C-HD PES00425
Diesel engine 3, 3516C-HD PES00426
Diesel engine 4, 3516C-HD PES00427
Diesel engine 5, 3516C-HD PES00428
Diesel engine 6, 3516C-HD PES00429

The measurements were performed in accordance with the EN ISO 17020 and EN 15259. The specific standards for each component are described in chapter 2.

The results are shown in table 0.1 and 0.2. All shown emission results are expressed in standard conditions which are a temperature of 273 kelvin and a pressure of 1013.25 mbar at dry flue gas and recalculated to 15% O_2.

Table 0.1 Emission results NO_x diesel engines

		measurement 1	measurement 2	measurement 3	emission requirement
	component	concentration in mg/Nm^3 at 15 vol. % O_2			
Engine 1	NO_x as NO_2	36	35	36	150
Engine 2		32	32	35	
Engine 3		39	42	43	
Engine 4		39	38	37	
Engine 5		45	43	44	
Engine 6		48	47	47	

Table 0.2 Emission results NH_3 diesel engines

		measurement
	component	concentration in mg/Nm^3 at 15 vol. % O_2
Engine 1	NH_3	4.3
Engine 2		5.8
Engine 3		1.7
Engine 4		1.9
Engine 5		1.6
Engine 6		0.6

Sending list

1. Mr. Adjiedj Ashikali from Borr Drilling (Digital)
2. KW3 B.V. archive (1x)

Colophon

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1 INTRODUCTION

1.1 Introduction

On 13 October 2020 KW3 B.V. has performed emission measurements on six diesel generators which are placed on the Prospector 1 of Borr Drilling. The measurements were performed for Borr Drilling. The air measurements were performed to establish the following components;

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The objective of these measurements was to determine the emissions during representative operation of the following installation:

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Diesel engine 4, 3516C-HD PES00427
Diesel engine 5, 3516C-HD PES00428
Diesel engine 6, 3516C-HD PES00429

The measurements were performed in accordance with the EN ISO 17020 and EN 15259. The specific standards for each component are described in chapter 2.

The measurement system is explained in chapter 3. In chapter 4 the measurement program is described. Chapter 5 shows the results and conclusions. Finally, in Chapter 6, a short explanation of the measurements uncertainty is given.

2 ASSESMENT FRAMEWORK AND INSTALLATIONS

2.1 Assessment framework

Basis voor emissie-eis Brandstof/afvalstof 1	
150	**mg/Nm3 bij 15 vol% O2**
Art. 3.10e Voor dieselmotoren (<600 kWth) in de offshore kan onder voorwaarden via een maatwerkvoorschrift een afwijkende emissie-eis tot 930 mg/Nm3 worden gesteld (art 3.10e 4e en 5e lid).	

Diesel engines (<600 kWth)

In afwijking van het eerste lid kan het bevoegd gezag bij maatwerkvoorschrift een hogere emissiegrenswaarde voor stikstofoxiden vaststellen voor een dieselmotor met een nominaal thermisch ingangsvermogen van minder dan 600 kWth gelegen op een platform dat is gelegen binnen de Nederlandse exclusieve economische zone. De afwijkende emissiegrenswaarde voor stikstofoxiden bedraagt ten hoogste 930 mg/Nm^3.

The measurement uncertainty of a maximum of 20% of the emission requirement is explained in favor of the license holder.

Performance measurements:

Measurements must be performed in accordance with applicable CEN standards. If there are no CEN standards, ISO standards, or national or international standards that provide data of equivalent quality, will be applied.

2.2 Installation description of the diesel engines

engine	Engine serial	Generator serial				
Engine 1	3516C-HD PES00424	9WZ00966	Caterpillar	3516CHD	Year 2011	1534 KW
Engine 2	3516C-HD PES00425	9WZ00967	Caterpillar	3516CHD	Year 2011	1534 KW
Engine 3	3516C-HD PES00426	9WZ00969	Caterpillar	3516CHD	Year 2011	1534 KW
Engine 4	3516C-HD PES00427	9WZ00968	Caterpillar	3516CHD	Year 2011	1534 KW
Engine 5	3516C-HD PES00428	9WZ00972	Caterpillar	3516CHD	Year 2011	1534 KW
Engine 6	3516C-HD PES00429	9WZ00970	Caterpillar	3516CHD	Year 2011	1534 KW

3 USED EQUIPMENT

3.1 Continuous measuring system KW3 B.V.

A schematic representation of the gas sampling system sampling system is shown in Appendix 1.

The system is made up of:
- a stainless steel suction probe incorporating an insulated filter;
- a heated sample hose with which the temperature of the extracted gases is conditioned at 160 ° C;
- a measuring gas cooler. This cools the aspirated gases to remove the moisture present in these gases;
- a diaphragm pump with a pre-filter to capturer dust particles.

From the main measuring gas line after the measuring gas cooler, a test gas-dried sample gas is offered for analysis on NO, NO_x, SO_2 and O_2.

Sampling and pre-treatment of the sample shall be carried out in accordance with NEN-EN 15259 and the following standards.

- A chemo luminescence monitor (Horiba PG 350) for the assessment of nitrogen oxides (NO, NO_x), inaccuracy less than 1% of the full scale (0-1000 vppm). The analyser is calibrated with a certified calibration span gas. The analysis of NO/NO_x is performed in accordance with EN 14792.

- Oxygen monitor, brand Horiba, type PG 350, operating according to the paramagnetic differential pressure principle, inaccuracy ± 0,5% of the smallest measuring range (0-10% O_2). The used range is 0 – 21 %. The analyzer is calibrated with outside air of 20.94 vol.% O_2. The analysis of O_2 is performed in accordance with EN 14789.

Before and after each measurement period, a two-point calibration has been performed for each analyser with nitrogen (zero gas) and sponges. The calibration is performed excluding the sampling system.

The span gas consists of a cylinder with nitrogen containing a known concentration of the component in question. The span gasses are supplied by a certified supplier and the analyses of the gasses are traceable to international standards.

For the analysers, measuring ranges and span gas used, see the appendices.

The registration system is connected to a data logger. Measurement data, such as flue gas, temperatures, pressures and the like, are presented in analogue form to the data logger, where the analog-digital conversion is performed. After this conversion, the measured values are transported to the computer. Further necessary calculations will take place in the office of KW3.

3.2 Discontinuous measuring system KW3 B.V.

NH_3
The concentration of NH_3 happens along wet-chemical way. The flue gas is hereby led via a heated filter and probe through a set of cooled impingers (glass bottles) with an adsorption liquid (0.05M H_2SO_4). The samples are rinsed in PTFE sample cans and kept below 20°C during storage and transportation to the laboratory. The concentrations have been determined afterwards in the laboratory.

Schematic overview of the sampling systems are shown in appendix 1, figure 1.

In the table below a list is presented with the measuring equipment used by KW3.

Table 3.1 Identification used equipment

Used analysers	
location	Prospector 1
Continu:	ID nummer
O_2	KW3-1064
NO_x	KW3-1064
Natchemisch:	ID nummer
NH_3	KW3-0141

3.3 Quality and safety

KW3 bv is accredited by the Accreditation Council (RvA) as explanatory conformity inspection body in accordance with the ISO/IEC 17020 accredited and is in possession of an accreditation statement. This statement has an attachment in which the exact scope of accreditation is described. The accredited topical scope is clear on the website of the RvA; www.rva.nl under number. I304. KW3 is by the RvA accredited as type A inspection company. This accreditation stands as a guarantee for impartial and independent measurements.
The accredited scope of operations includes the continuous sampling of gaseous flue gas components (NO_x, total unburned hydrocarbons (C_xH_y), O_2, CO_2, CO, SO_2), dioxins/furans, polycyclic aromatic hydrocarbons, HCl, HF, Hg, SO_2, NH_3, H_2S, volatile heavy metals, dust and dust bound components, as well as for the determination of physical parameters such as flue gas flow rate, temperature and moisture content.

KW3 is certified in accordance with the safety checklist contractors VCA methodology (VCA 2008/5.1). This means that an external certifying body shall review periodically this core values. All our staff are in the possession of a personal VCA certification; Vol-VCA. The LMRA methodology is always applied prior to the KW3 work.

For more detailed information about the accredited scope of operations of KW3 please visit the website of the RvA; www.rva.nl (search term I304). More info on QHSE related issues can be found on our website; www.kw3.nl.

3.4 Applied standards

The table below shows the standards that apply to the work performed.

Table 3.2 Overview applied standards

component	norm
Emission sampling	EN 15259
NH_3	NEN 2826
O_2	EN 14789
NO_x als NO_2	EN 14792

4 MEASURING PROGRAM

4.1 General

The entire measurement programs of the diesel engines were performed on 13 October 2020. During the measurements the engines was driven by normal day by day conditions. For NO_x three samples per engine were taken. For NH_3 one sample per engine was taken.

Table 4.1 and 4.2 shows the measurement program.

Table 4.1 Measuring program NO_x

Installation	Platform	Date	Time period
Engine 1	Prospector 1	13 October 2020	
Engine 2			14:21 – 15:06
Engine 3			15:46 – 16:31
Engine 4			06:50 – 07:35
Engine 5			07:50 – 8:35
Engine 6			10:23 – 11:08

Table 4.2 Measuring program NH_3

Installation	Platform	Date	Time period
Engine 1	Prospector 1	13 October 2020	11:52 – 12:32
Engine 2			14:21 – 15:01
Engine 3			15:46 – 16:26
Engine 4			6:51 – 7:31
Engine 5			7:45 – 8:25
Engine 6			10:24 – 11:04

4.2 Operation conditions

The generator performed at standard process conditions during the measurements. All engines were on load between 60 and 80%. See appendix 4.

4.3 Description measuring place

Table 4.2 Description measuring area

Parameters position measuring surface	Criteria	Engines
Placement stack at measuring surface	horizontal / vertical	horizontal
distance after disturbance	> 5 x Dn.	compliant
distance straight duct after measuring surface	> 2 x Dn.	compliant
distance till outlet stack	> 5 x Dn.	compliant

The sampling point was short after the engine. Only one measuring port was available.
Photos of the measuring points can be found in appendix 8.

4.4 Calculation of emissions

The flue gas concentrations are measured in vppm. Conversion of vppm to mg / Nm^3 is done according to the following factors:

- NOx vppm multiplied by 2.0538; Being the molar mass of NO_2 (46.0055 kg / kmol) divided by the molar volume of NO (22.4 m^3 / kmol);

De NO_x concentration is calculated to 15 vol. % O_2 according to the following formula:

$$E_{ref} = E_m * \frac{21 - O_{2,ref}}{21 - O_{2,m}}$$

met:

- E_{ref} = Concentration at reference O_2-gehalte [mg/Nm^3];
- E_m = measured concentration at actual O_2 [mg/Nm^3];
- $O_{2,ref}$ = reference O_2-gehalte [vol.%];
- $O_{2,m}$ = measured O_2-gehalte [vol.%];
- 21 = O_2-concentration in dry air [vol.%].

4.5 Deviations on quote or used standard

The measurements were performed short after the engines.

5 EMISSION RESULTS

5.1 Measuring results

This chapter presents the measurement and calculation results obtained. In Appendix 2 and 3, the measurement and calculation results are presented in extensive form.

The results are shown in table 5.1 and 5.2 All shown emission results are expressed in standard conditions which are a temperature of 273 kelvin and a pressure of 1013.25 mbar at dry flue gas and recalculated to 15% O_2.

Table 5.1 Emission results NO_x diesel engines

		measurement 1	measurement 2	measurement 3	emission requirement
	Component	concentration in mg/Nm^3 at 15 vol. % O_2			
Engine 1	NO_x as NO_2	36	35	36	150
Engine 2		32	32	35	
Engine 3		39	42	43	
Engine 4		39	38	37	
Engine 5		45	43	44	
Engine 6		48	47	47	

Table 5.2 Emission results NH_3 diesel engines

		measurement 1
	component	concentration in mg/Nm^3 at 15 vol. % O_2
Engine 1	NH_3	4.3
Engine 2		5.8
Engine 3		1.7
Engine 4		1.9
Engine 5		1.6
Engine 6		0.6

6 MEASUREMENT UNCERTAINTY

6.1 Measuring uncertainty KW3

Measurement uncertainty indicates the uncertainty of a measured value of a given quantity. Each measurement performed has some degree of uncertainty. A method has been established within the VKL (Association of Quality Air Measurements) for measuring uncertainties. The calculations are based on cumulative measurement uncertainties, reduced to 1 u absolute. Then, the measurement of the square squared of the applicable partial error sources is taken per measurement. For the calculation of the total measurement uncertainty at a 95% confidence interval, there are multiplied by two. The relative measurement uncertainty is calculated by the quotient of absolute measurement uncertainty and the measured value.

Based on a calculation tool prepared by the VKL regarding performance characteristics of emission measurements, a current uncertainty is calculated. In addition to the current uncertainty, a measurement must meet uncertainties according to applied standards and guidelines. See the tables below for the uncertainties. The measurement uncertainty is presented as the 95% confidence interval.

Table 6.1 Overview measuring uncertainty

Algemene gegevens					
Referentienummer	20200099				
Meetlocatie	engines				
Meting uitgevoerd door	AvM				
Continue meting		eenheid	resultaat	meetonzekerheid [absoluut]	[%]
O_2		vol.%	12.5	0.45	3.6
NO_x (als NO_2)		mg/Nm^3	54.0	9.05	16.8
CO		mg/Nm^3	9.6	5.96	62.2
Discontinue meting	fase	eenheid	resultaat	meetonzekerheid [absoluut]	[%]
NH3	gasvormig	mg/Nm3			

6.2 Measuring uncertainty according to activity decree

In the license, the competent authority may determine that the company (or the measurement agency) must determine the measurement uncertainty of the measurement. The value of the measurement uncertainty of a particular measurement result is important for the review must therefore be reported in an insightful manner by the company / the measurement agency. Instead, the following values can also be included in the license and used for any correction on the measured value.

Table 6.2 Overview measuring uncertainty

component	Maximum uncertainty [%]
NO_x	20
other components	40

APPENDICES

Appendix 1 Schematic view measuring systems

Figure 1 Schematic overview continuous measuement system

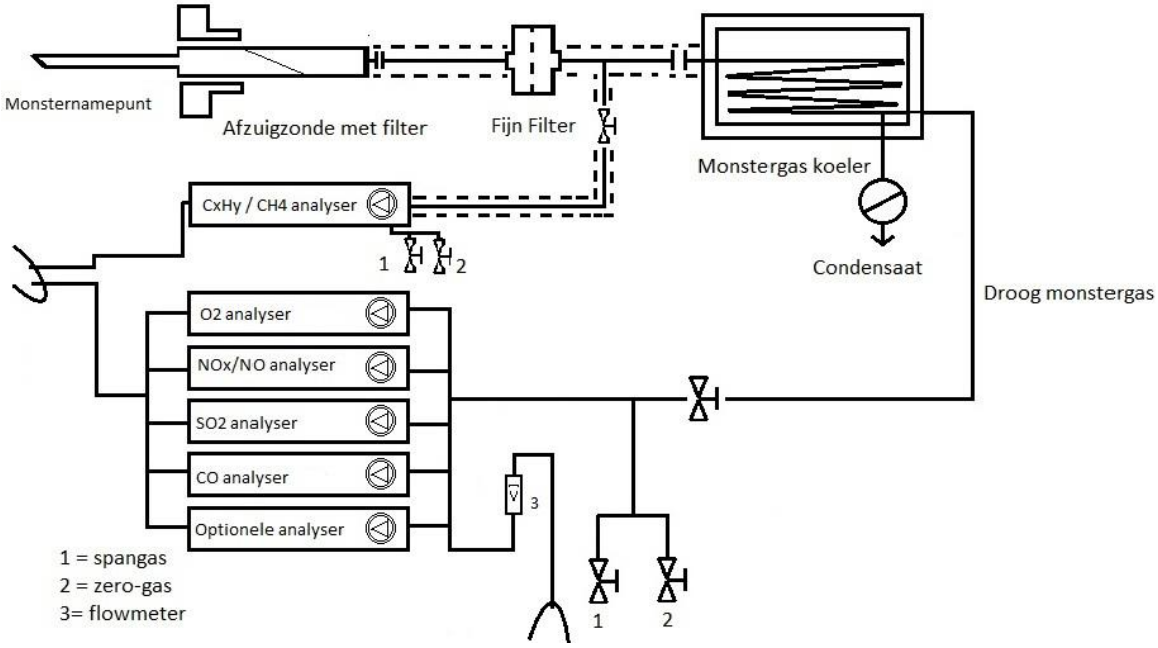
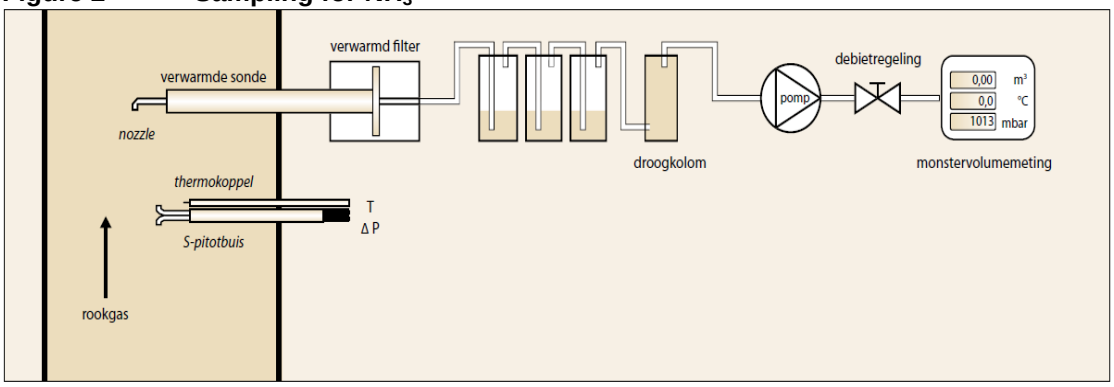


Figure 2 Sampling for NH_3



Appendix 2 Emission results

Engine 1

Bedrijf			Borr Drilling Prospector 1		
Installatie			engine 1		
Datum			13-okt-20		
Software versie			Software versie 6.19		
Meting			1	2	3
Datum			13-okt-20	13-okt-20	13-okt-20
Meetperiode	van	[uur]	12:15	12:30	12:45
	tot	[uur]	12:30	12:45	13:00
Meetduur		[min]	00:15	00:15	00:15
Fuel (oil) consumption		[kg/h]	277		
Fuel (oil) consumption	B	[l/h]	326		
SCR Ureum flow	B	[l/min]	0.16		
Flue gas comonents					
Flue gas temperature		[°C]	381		
CO_2-gehalte	dry	[vol.%]	6.45	6.42	6.52
O_2-gehalte	dry	[vol.%]	12.08	12.09	11.89
CO-gehalte	dry	[vppm]	<3.0	<3.0	<3.0
CO-gehalte	dry	[mg/Nm^3]	<3.8	<3.8	<3.8
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	<2.5	<2.5	<2.5
NO_x-gehalte als NO	dry	[vppm]	26	25	27
NO_x-emissie als NO_2	dry	[mg/Nm^3]	54	52	55
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	36	35	36

Engine 2

Bedrijf			Borr Drilling Prospector 1		
Installatie			engine 2		
Datum			13-okt-20		
Software versie			Software versie 6.19		
Meting			1	2	3
Datum			13-okt-20	13-okt-20	13-okt-20
Meetperiode	van	[uur]	14:21	14:36	14:51
	tot	[uur]	14:36	14:51	15:06
Meetduur		[min]	00:15	00:15	00:15
Fuel (oil) consumption		[kg/h]	277.95		
Fuel (oil) consumption	B	[l/h]	327		
SCR Ureum flow	B	[l/min]	0.16		
Flue gas comonents					
Flue gas temperature		[°C]	381		
CO_2-gehalte	dry	[vol.%]	6.28	6.27	6.25
O_2-gehalte	dry	[vol.%]	12.29	12.21	12.21
CO-gehalte	dry	[vppm]	17.5	10.7	7.8
CO-gehalte	dry	[mg/Nm^3]	21.8	13.4	9.8
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	15.0	9.1	6.7
NO_x-gehalte als NO	dry	[vppm]	23	23	25
NO_x-emissie als NO_2	dry	[mg/Nm^3]	47	47	51
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	32	32	35

Engine 3

Bedrijf			Borr Drilling Prospector 1		
Installatie			engine 3		
Datum			13-okt-20		
Software versie			Software versie 6.19		
Meting			1	2	3
Datum			13-okt-20	13-okt-20	13-okt-20
Meetperiode	van	[uur]	15:46	16:01	16:16
	tot	[uur]	16:01	16:16	16:31
Meetduur		[min]	00:15	00:15	00:15
Fuel (oil) consumption		[kg/h]	292.40		
Fuel (oil) consumption	B	[l/h]	344		
SCR Ureum flow	B	[l/min]	0.15		
Flue gas comonents					
Flue gas temperature		[°C]	365		
CO_2-gehalte	dry	[vol.%]	6.37	6.37	5.18
O_2-gehalte	dry	[vol.%]	12.06	12.06	13.64
CO-gehalte	dry	[vppm]	<3.0	<3.0	<3.0
CO-gehalte	dry	[mg/Nm^3]	<3.8	<3.8	<3.8
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	<2.5	<2.5	<2.5
NO_x-gehalte als NO	dry	[vppm]	29	30	25
NO_x-emissie als NO_2	dry	[mg/Nm^3]	59	62	52
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	39	42	43

Engine 4

Bedrijf			Borr Drilling Prospector 1		
Installatie			engine 4		
Datum			13-okt-20		
Software versie			Software versie 6.19		
Meting			1	2	3
Datum			13-okt-20	13-okt-20	13-okt-20
Meetperiode	van	[uur]	6:50	7:05	7:20
	tot	[uur]	7:05	7:20	7:35
Meetduur		[min]	00:15	00:15	00:15
Fuel (oil) consumption		[kg/h]	212.50		
Fuel (oil) consumption	B	[l/h]	250		
SCR Ureum flow	B	[l/min]	0.15		
Flue gas comonents					
Flue gas temperature		[°C]	383		
CO_2-gehalte	dry	[vol.%]	6.12	6.16	6.15
O_2-gehalte	dry	[vol.%]	12.53	12.45	12.44
CO-gehalte	dry	[vppm]	6.8	6.7	9.5
CO-gehalte	dry	[mg/Nm^3]	8.5	8.4	11.9
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	6.0	5.9	8.3
NO_x-gehalte als NO	dry	[vppm]	27	26	26
NO_x-emissie als NO_2	dry	[mg/Nm^3]	54	54	53
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	39	38	37

Engine 5

Bedrijf		Borr Drilling Prospector 1			
Installatie		engine 5			
Datum		13-okt-20			
Software versie		Software versie 6.19			
Meting			1	2	3
Datum			13-okt-20	13-okt-20	13-okt-20
Meetperiode	van	[uur]	7:50	8:05	8:20
	tot	[uur]	8:05	8:20	8:35
Meetduur		[min]	00:15	00:15	00:15
Fuel (oil) consumption		[kg/h]			
Fuel (oil) consumption	B	[l/h]	-		
SCR Ureum flow	B	[l/min]	0.13		
Flue gas comonents					
Flue gas temperature		[°C]	394		
CO_2-gehalte	dry	[vol.%]	6.26	6.47	6.23
O_2-gehalte	dry	[vol.%]	12.29	11.99	12.31
CO-gehalte	dry	[vppm]	<3.0	<3.0	<3.0
CO-gehalte	dry	[mg/Nm^3]	<3.8	<3.8	<3.8
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	<2.5	<2.5	<2.5
NO_x-gehalte als NO	dry	[vppm]	32	31	31
NO_x-emissie als NO_2	dry	[mg/Nm^3]	66	64	64
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	45	43	44

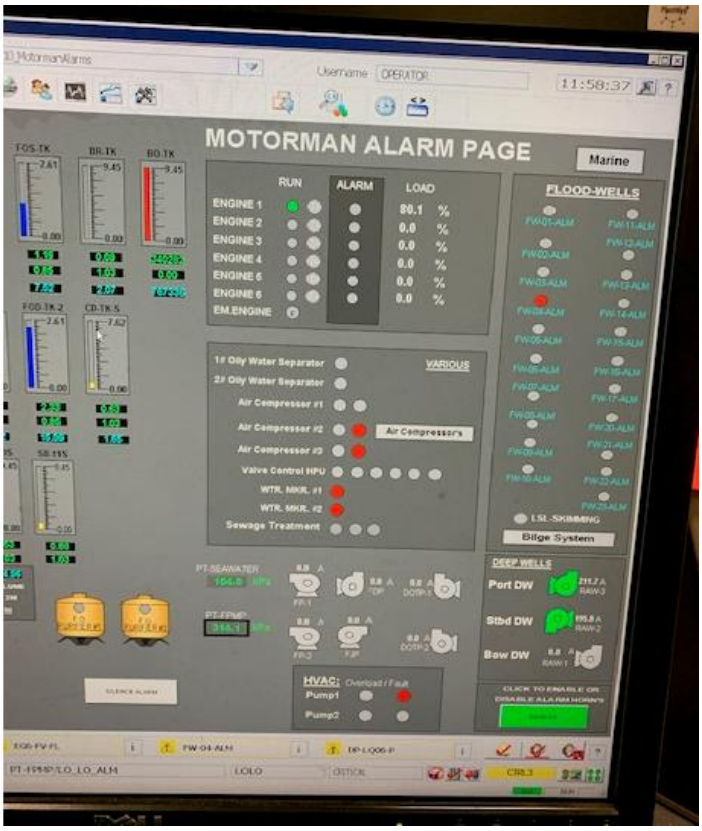
Engine 6

Bedrijf			Borr Drilling Prospector 1		
Installatie			engine 6		
Datum			13-okt-20		
Software versie			Software versie 6.19		
Meting			1	2	3
Datum			13-okt-20	13-okt-20	13-okt-20
Meetperiode	van	[uur]	10:23	10:38	10:53
	tot	[uur]	10:38	10:53	11:08
Meetduur		[min]	00:15	00:15	00:15
Fuel (oil) consumption		[kg/h]	249		
Fuel (oil) consumption	B	[l/h]	293		
SCR Ureum flow	B	[l/min]	0.10		
Flue gas comonents					
Flue gas temperature		[°C]	399		
CO_2-gehalte	dry	[vol.%]	6.14	6.14	6.11
O_2-gehalte	dry	[vol.%]	12.49	12.44	12.47
CO-gehalte	dry	[vppm]	3.2	<3.0	<3.0
CO-gehalte	dry	[mg/Nm^3]	3.9	<3.8	<3.8
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	2.8	<2.5	<2.5
NO_x-gehalte als NO	dry	[vppm]	33	33	32
NO_x-emissie als NO_2	dry	[mg/Nm^3]	68	67	66
Concentratie betrokken op 15 vol. % O2	dry	[mg/Nm^3]	48	47	47

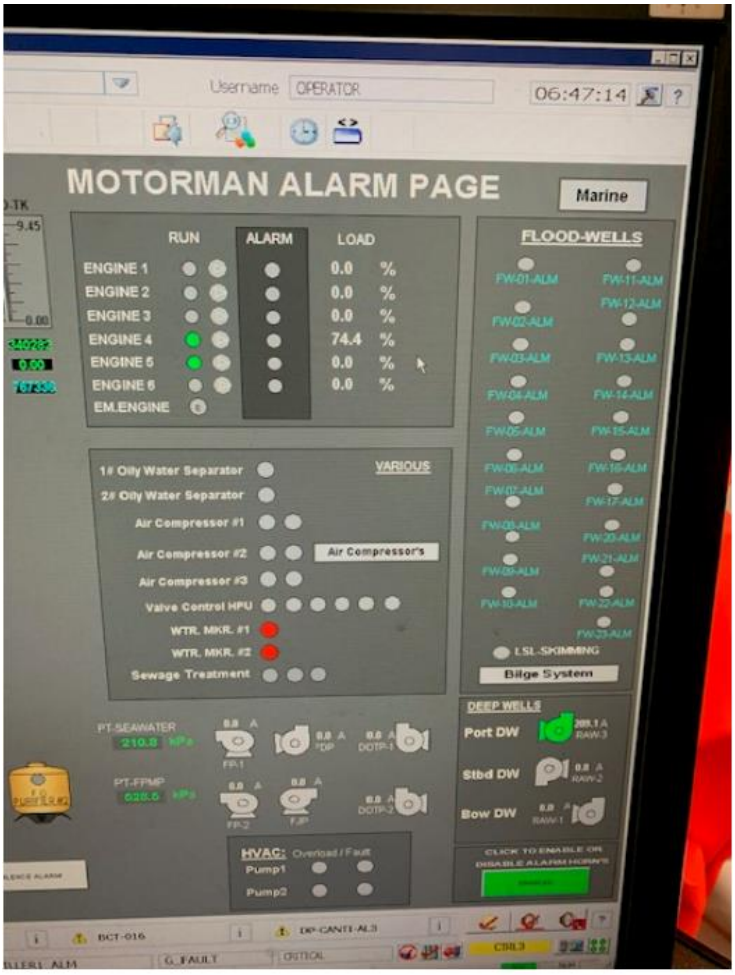
Appendix 3 Measuring results NH3

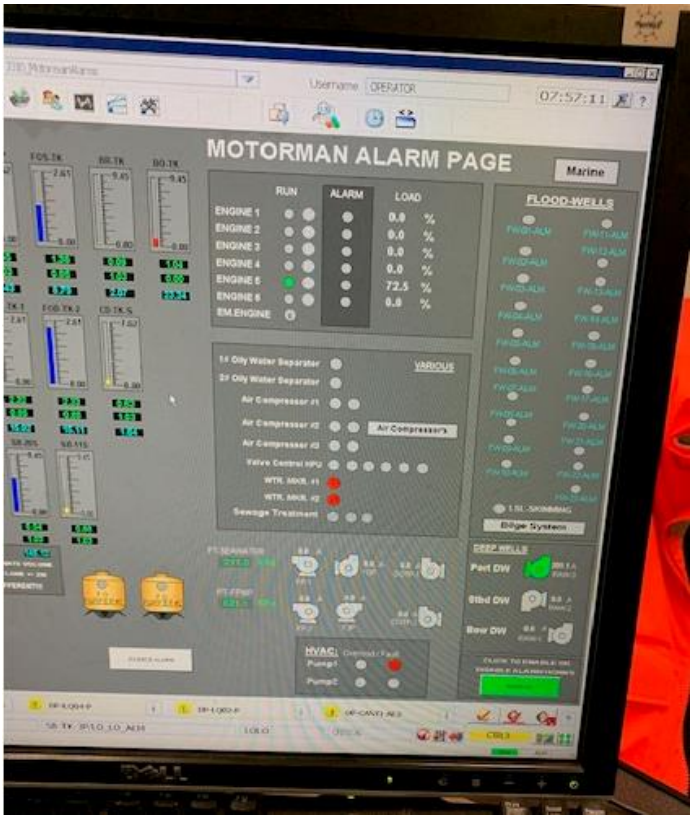
Installatie			engine 4			apparatuur :	KW3-0141		
Projectnummer			20200099						
Component			**NH_3**						
Software versie			Software versie 6.19	engine 4	engine 5	engine 6	engine 1	engine 2	engine 3
Meting				1	2	3	4	5	6
Meetdatum				13-Oct-20	13-Oct-20	13-Oct-20	13-Oct-20	13-Oct-20	13-Oct-20
Meetperiode	van	[uur]		6:51	07:45	10:24	11:52	14:21	15:46
	tot	[uur]		7:31	08:25	11:04	12:32	15:01	16:26
Meetduur		[uren]		00:40	00:40	00:40	00:40	00:40	00:40
Barometerstand		[mbar]		1007	1007	1007	1009	1009	1009
Bemonsteringgegevens									
Afgelezen temp. meetlans		[°C]		150					
Aflezing gasmeter begin	droog	[m^3]		9.159	9.345	9.533	9.717	9.902	10.087
Aflezing gasmeter eind		[m^3]		9.345	9.533	9.717	9.902	10.086	10.265
Temperatuur gasmeter begin		[°C]		28	28	28	29	30	29
Temperatuur gasmeter eind		[°C]		28	28	29	30	30	29
Afgezogen volgens gasmeter	droog	[Nm^3]		0.168	0.169	0.166	0.166	0.165	0.160
Emissiegegevens									
Concentratie NH_3	droog	[mg/Nm^3]		2.72	2.39	0.86	6.32	8.53	2.53
Gemeten O2 concentratie		[vol %]		12.49	12.13	12.47	12.12	12.23	12.05
Concentratie NH3 bij 15 vol% O2		**[mg/Nm3]**		**1.91**	**1.62**	**0.60**	**4.27**	**5.84**	**1.69**
Blanco		[mg/Nm^3]		0.08					

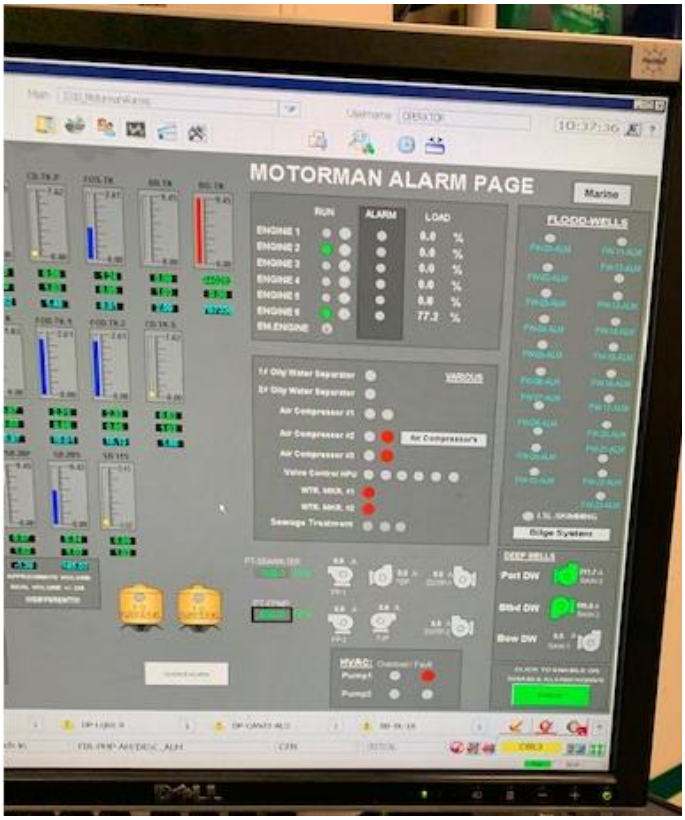
Appendix 4 Engine load during measurements




MOTORMAN ALARM PAGE
Marine
RUN
ALARM
LOAD
FLOOD-WELLS
Port DW
Stbd DW
Bow DW


Username
OPERATOR
06:47:14
MOTORMAN ALARM PAGE
Marine
RUN
ALARM
LOAD
ENGINE 1
ENGINE 2
ENGINE 3
ENGINE 4
ENGINE 5
ENGINE 6
EM.ENGINE
0.0 %
0.0 %
0.0 %
74.4 %
0.0 %
0.0 %
FLOOD-WELLS
VARIOUS
1# Oily Water Separator
2# Oily Water Separator
Air Compresser #1
Air Compresser #2
Air Compressor #3
Air Compressor's
Valve Control HPU
WTR. MKR. #1
WTR. MKR. #2
Sewage Treatment
LSL-SKIMMING
Bilge System
DEEP WELLS
Port DW
Stbd DW
Bow DW
HVAC: Overload / Fault
Pump1
Pump2


Username OPERATOR
07:57:11
MOTORMAN ALARM PAGE
Marine
RUN
ALARM
LOAD
ENGINE 1
ENGINE 2
ENGINE 3
ENGINE 4
ENGINE 5
ENGINE 6
EM.ENGINE
0.0 %
0.0 %
0.0 %
0.0 %
72.5 %
0.0 %
FLOOD-WELLS
VARIOUS
Air Compressor's
Bilge System
DEEP WELLS
Port DW
Stbd DW
Bow DW
HVAC


Username OPERATOR
10:37:36
MOTORMAN ALARM PAGE
Marine
RUN
ALARM
LOAD
ENGINE 1
ENGINE 2
ENGINE 3
ENGINE 4
ENGINE 5
ENGINE 6
EM.ENGINE
0.0 %
0.0 %
0.0 %
0.0 %
0.0 %
77.2 %
FLOOD-WELLS
VARIOUS
Air Compressor's
Bilge System
DEEP WELLS
Port DW
Stbd DW
Bow DW
HVAC

Appendix 5 Laboratory results NH3

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AGROLAB GROUP
Your labs. Your service.

KW3
Dhr. A. van Meekeren
Generatorstraat 13C
3903 LH Veenendaal

Datum	22.10.2020
Relatienr	35009130
Opdrachtnr.	983660

ANALYSERAPPORT

Opdracht **983660 Gas/Lucht**

Opdrachtgever	35009130 KW3
Uw referentie	20200099
Opdrachtacceptatie	19.10.20
Monsternemer	Opdrachtgever

Geachte heer, mevrouw,

Hierbij zenden wij u de resultaten van het door u aangevraagde laboratoriumonderzoek.

Dit rapport mag alleen in zijn geheel worden gereproduceerd. Eventuele bijlagen zijn onderdeel van het rapport.

Indien u nog vragen heeft of aanvullende informatie wenst, verzoeken wij u om contact op te nemen met Klantenservice.

Wij vertrouwen erop u met de toegezonden informatie van dienst te zijn.

Met vriendelijke groet,

AL-West B.V. Dhr. Peter Wijers, Tel. 31/570788111
Klantenservice

AL-West B.V.
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AGROLAB GROUP
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Opdracht **983660 Gas/Lucht**

Monsternr.	*Monsteromschrijving*	*Monstername*	*Monsternamepunt*
182336	NH3 blanco 13-10-2020	13.10.2020	
182337	M4 NH3 13-10-2020	13.10.2020	
182338	M5 NH3 13-10-2020	13.10.2020	
182339	M6 NH3 13-10-2020	13.10.2020	
182340	M1 NH3 13-10-2020	13.10.2020	

	Eenheid	182336 NH3 blanco 13-10-2020	182337 M4 NH3 13-10-2020	182338 M5 NH3 13-10-2020	182339 M6 NH3 13-10-2020	182340 M1 NH3 13-10-2020
Klassiek Chemische Analyses						
Ammonium (als N) (impinger)	mg/l	<0,1	3,2	2,4	0,8	7,2
Overig onderzoek						
Volume	ml	107 *	117 *	139 *	146 *	120 *

De parameters die in dit document worden vermeld, zijn geaccrediteerd volgens ISO / IEC 17025: 2005. Alleen niet-geaccrediteerde parameters / resultaten zijn gemarkeerd met het symbool "*"

Kamer van Koophandel Nr. 08110898
VAT/BTW-ID-Nr.: NL 811132559 B01

Directeur
ppa. Marc van Gelder
Dr. Paul Wimmer

RvA T 005

AL-West B.V.
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Opdracht **983660 Gas/Lucht**

Monsternr.	*Monsteromschrijving*	*Monstername*	*Monsternamepunt*
182341	M2 NH3 13-10-2020	13.10.2020	
182342	M3 NH3 13-10-2020	13.10.2020	

	Eenheid	182341 M2 NH3 13-10-2020	182342 M3 NH3 13-10-2020
Klassiek Chemische Analyses			
Ammonium (als N) (impinger)	mg/l	9,9	2,8
Overig onderzoek			
Volume	ml	117 *	119 *

Verklaring:"<" of n.a. betekent dat het gehalte van de component lager is dan de rapportagegrens.
De parameter-specifieke meetonzekerheid en informatie over de berekeningsmethode zijn op aanvraag beschikbaar, indien de gerapporteerde resultaten boven de parameterspecifieke rapportagegrens liggen.

Begin van de analyses: 10.10.2020
Einde van de analyses: 22.10.2020

De resultaten hebben uitsluitend betrekking op de geanalyseerde monsters. In gevallen waarin het testlaboratorium niet verantwoordelijk was voor de bemonstering, gelden de gerapporteerde resultaten voor de monsters zoals zij zijn ontvangen. .

AL-West B.V. Dhr. Peter Wijers, Tel. 31/570788111
Klantenservice

Toegepaste methoden
conform NEN-ISO 15923-1: Ammonium (als N) (impinger)
Eigen methode; bepaling op massa-basis: Volume *

De parameters die in dit document worden vermeld, zijn geaccrediteerd volgens ISO / IEC 17025: 2005. Alleen niet-geaccrediteerde parameters / resultaten zijn gemarkeerd met het symbool "*".

Kamer van Koophandel Nr. 08110896
VAT/BTW-ID-Nr.: NL 811132559 B01
Directeur ppa. Marc van Gelder
Dr. Paul Wimmer

TESTING RvA L 086

Appendix 6 Control sheets continuous measurements KW3

Installatie	: Borr Drilling Prospector 1												
Opdrachtnummer	: 20200099												
Meettechnici	: AvM												
Datum	: 13-okt-20												
Revisie versie en datum	Software versie 6.19												
Controlesheet kalibratie en drift							1e controle voor en na kalibratie direct op monitoren				controle drift direct op analyzers		
					Datum en tijd		13-10-20 6:45		1		13-10-20 16:38		2
					Installatie		Borr Drilling Prospector 1						
	ID-code		Range	IJkgas			zero	span	zero		zero	span	zero
O_2	KW3-1064	Horiba PG350	0-21	20.95	Call.		0.05	21.04			0.07	20.83	
vol.%					Just.								
NO_x	KW3-1064	Horiba PG350	0-100	80.3	Call.		0.3	77.0			0.2	78.7	
vppm					Just.			80.1					
CO	KW3-1064	Horiba PG350	0-100	80.7	Call.		0.3	79.5			0.0	79.8	
vppm					Just.								
Converter rendement NO2 [%]: >98%				Waarden:					Acties:				
					= drift < 2%				Geen actie				
					= drift > 2 < 5 %				Meetdata corrigeren voor drift				
					= drift > 5 %				Meetdata afkeuren				

Appendix 7 Accreditation certificate KW3 B.V.

RAAD VOOR ACCREDITATIE

Postbus 2768 3500 GT Utrecht

De Stichting Raad voor Accreditatie,
bij wet aangewezen als de nationale accreditatie-instantie voor Nederland,
verklaart hierbij accreditatie te hebben verleend aan:

KW3 B.V.
Veenendaal

De instelling heeft aangetoond in staat te zijn inspecties, als type A inspectie-instelling, op een competente, consistente en onafhankelijke wijze uit te voeren.

Deze accreditatie is gebaseerd op een beoordeling tegen de vereisten zoals vastgelegd in EN ISO/IEC 17020:2012.

De accreditatie is van toepassing op de activiteiten zoals gespecificeerd in de gewaarmerkte bijlage die is voorzien van het registratienummer.

De accreditatie is van kracht, onder voorwaarde dat de instelling blijft voldoen aan de vereisten.

De accreditatie voor registratienummer:

I 304

is verleend op 29 januari 2015

Deze verklaring is geldig tot
01 juni 2024

Het bestuur van de Raad voor Accreditatie,
namens deze,

mr. J.A.W.M. de Haas

De Stichting Raad voor Accreditatie is ondertekenaar van de European co-operation for Accreditation (EA) Multilateral Agreement voor accreditatie in dit werkgebied.

Appendix 8 Photos installations