CARNIVAL
CORPORATION & PLC.

Exhaust Gas Cleaning Program 2018

Responses to EPA Questions from 27 Aug '18

Miami

11 September, 2018

AIDA Carnival Costa CUNARD fathom

Holland America Line P&O CRUISES P&O PRINCESS CRUISES

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Carnival Cruise Line (CCL)

Year 2017

					US VGP waters outside alaska			US VGP waters inside alaska				
Brand	Ship name	Total non VGP hrs	time % non VGP hrs	Total VGP hrs	time % VGP hrs	Time % ship not in pH compliance (VGP rules)	pH not compliant number of records (VGP rules)	time % VGP hrs	Time % ship not in pH compliance (AOC rules)	pH not compliant number of records (AOC rules)	Time % ship not in pH compliance (VGP rules)	pH not compliant number of records (VGP rules)
CCL	CCL Conquest	8197	94%	563	6%	18.18%	2	0%				
CCL	CCL Ecstasy	7871	90%	889	10%	5.67%	217	0%				
CCL	CCL Elation	7982	91%	778	9%	2.16%	162	0%				
CCL	CCL Fantasy	7589	87%	1171	13%	11.85%	740	0%				
CCL	CCL Glory	7918	90%	842	10%	31.75%	20	0%				
CCL	CCL Legend	6977	80%	1783	6%	0.00%	0	14%	0%	1	9.46%	1108
CCL	CCL Liberty	7943	91%	818	9%	2.47%	2	0%				
CCL	CCL Magic	7966	91%	794	9%	0.00%	0	0%				
CCL	CCL Miracle	7896	90%	864	8%	0.00%	0	1%	0%	0	1.67%	29
CCL	CCL Paradise	7456	85%	1304	15%	4.42%	244	0%				
CCL	CCL Pride	7339	84%	1421	16%			0%				
CCL	CCL Sunshine	7771	89%	989	11%	0.00%	0	0%				
CCL	CCL Triumph	6981	80%	1779	20%	54.55%	12	0%				
CCL	CCL Valor	7897	90%	863	10%	75.00%	6	0%				
CCL	CCL Victory	7191	82%	1569	18%	0.10%	2	0%				

Notes

- VGP details available from the 9th of January 2017
- Unexpected/undefined values (pH<0.5 and pH>14) are not considered as not compliant
- pH differential allowance not yet considered in VGP outside Alaska
- AOC rules implemented are reported in the back-up slides as a reference
- Carnival Paradise DG6 and Carnival Pride all DGs have been excluded from the analysis due to issues on the pH signal
- Analysis made on all the data available through Neptune

Holland America Line & Princess Cruises (HAL & PCL)

Year 2017

					US VGP waters outside alaska			US VGP waters inside alaska				
Brand	Ship name	Total non VGP hrs	time % non VGP hrs	Total VGP hrs	time % VGP hrs	Time % ship not in pH compliance (VGP rules)	pH not compliant number of records (VGP rules)	time % VGP hrs	Time % ship not in pH compliance (AOC rules)	pH not compliant number of records (AOC rules)	Time % ship not in pH compliance (VGP rules)	pH not compliant number of records (VGP rules)
HAL	Amsterdam	6907	79%	1853	6%	3.49%	223	16%	0.02%	4	1.02%	174
HAL	Eurodam	6133	70%	2627	13%	2.70%	591	17%	0.11%	21	12.76%	2447
HAL	Maasdam	8205	94%	555	6%	3.25%	113	0%				
HAL	MS Koningsdam	8357	95%	403	5%	0.00%	0	0%				
HAL	Nieuw Amsterdam	6605	75%	2155	5%	17.57%	1288	19%	0.29%	55	3.34%	627
HAL	Noordam	6746	77%	2014	2%	1.54%	28	21%	0.13%	39	8.12%	2504
HAL	Oosterdam	6934	79%	1826	11%	8.37%	1070	10%	0.11%	19	10.80%	1879
HAL	Rotterdam	8340	95%	420	5%	7.01%	407	0%				
HAL	Veendam	8160	93%	600	7%	8.97%	69	0%				
HAL	Volendam	6934	79%	1826	1%	48.28%	1195	20%	0.37%	65	4.01%	697
HAL	Westerdam	8426	96%	334	4%	1.56%	33	0%				
HAL	Zaandam	6894	79%	1866	1%	9.46%	141	20%	0.05%	13	2.47%	674
HAL	Zuiderdam	8376	96%	384	4%	0.14%	1	0%				
PCL	Caribbean PR	8533	97%	227	3%	0.34%	1	0%				
PCL	Coral PR	6494	74%	2266	2%	68.30%	153	24%	2.40%	618	22.71%	5836
PCL	Crown PR	8370	96%	390	4%	14.43%	402	0%				
PCL	Grand PR	7228	83%	1532	6%	0.00%	0	11%	0.06%	15	1.88%	460
PCL	Emerald PR	7095	81%	1666	8%	55.85%	4908	11%	11.31%	1593	52.60%	7391
PCL	Island PR	6598	75%	2162	2%	22.09%	36	22%	0.01%	1	2.58%	214
PCL	Regal PR	8282	95%	478	5%	3.05%	28	0%				
PCL	Royal PR	8549	98%	211	2%	2.19%	10	0%				
PCL	Ruby PR	5827	67%	2933	14%	16.92%	1642	19%	0.27%	49	11.92%	2194
PCL	Star PR	6388	73%	2372	10%	2.81%	50	17%	0.22%	24	1.98%	219

Notes

- VGP details available from the 9th of January 2017
- Unexpected/undefined values (pH<0.5 and pH>14) are not considered as not compliant
- pH differential allowance not yet considered in VGP outside Alaska
- AOC rules implemented are reported in the back-up slides as a reference
- Analysis made on all the data available through Neptune

CCL

Year 2018 *data up to the 27th of August*

					US VGP waters outside alaska			US VGP waters inside alaska				
Brand	Ship name	Total non VGP hrs	time % non VGP hrs	VGP hrs	time % VGP hrs	Time % ship not in pH compliance (VGP rules)	pH not compliant number of records (VGP rules)	time % VGP hrs	Time % ship not in pH compliance (AOC rules)	pH not compliant number of records (AOC rules)	Time % ship not in pH compliance (VGP rules)	pH not compliant number of records (VGP rules)
CCL	CCL Dream	4815	84%	921	16%	0.00%	0	0%				
CCL	CCL Ecstasy	5137	90%	599	10%	32.13%	2096	0%				
CCL	CCL Elation	5130	89%	606	11%	13.03%	718	0%				
CCL	CCL Fantasy	4965	87%	771	13%	23.66%	330	0%				
CCL	CCL Freedom	5345	93%	391	7%	51.85%	14	0%				
CCL	CCL Glory	4962	87%	774	13%	64.47%	49	0%				
CCL	CCL Horizon	5412	94%	324	6%	33.33%	6	0%				
CCL	CCL Legend	4783	83%	953	4%			13%	0.07%	11	3.02%	443
CCL	CCL Liberty	4982	87%	754	13%	0.00%	0	0%				
CCL	CCL Magic	4983	87%	753	13%			0%				
CCL	CCL Miracle	5161	90%	575	10%	0.50%	8	0%				
CCL	CCL Paradise	5150	90%	586	10%	1.58%	138	0%				
CCL	CCL Pride	4766	83%	970	17%	17.46%	1444	0%				
CCL	CCL Sunshine	5253	92%	483	8%	100.00%	6	0%				
CCL	CCL Valor	5203	91%	533	9%	40.00%	16	0%				
CCL	CCL Victory	4942	86%	794	14%	5.97%	403	0%				

Notes

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- pH differential allowance not yet considered in VGP outside Alaska
- AOC rules implemented are reported in the back-up slides as a reference
- Analysis made on all the data available through Neptune

HAL & PCL

Year 2018 *data up to the 27th of August*

					US VGP waters outside alaska			US VGP waters inside alaska				
Brand	Ship name	Total non VGP hrs	time % non VGP hrs	VGP hrs	time % VGP hrs	Time % ship not in pH compliance (VGP rules)	pH not compliant number of records (VGP rules)	time % VGP hrs	Time % ship not in pH compliance (AOC rules)	pH not compliant number of records (AOC rules)	Time % ship not in pH compliance (VGP rules)	pH not compliant number of records (VGP rules)
HAL	Amsterdam	4677	82%	1059	6%	7.41%	520	12%	0.57%	96	24.07%	4037
HAL	Eurodam	4073	71%	1663	12%	8.48%	1248	17%	0.05%	12	14.90%	3677
HAL	Maasdam	5286	92%	450	8%	7.44%	384	0%				
HAL	MS Koningsdam	5512	96%	224	4%	4.44%	2	0%				
HAL	Nieuw Amsterdam	4131	72%	1605	6%	3.90%	276	22%	0.19%	67	6.98%	2519
HAL	Noordam	4185	73%	1552	1%	0.00%	0	26%	0.27%	94	5.76%	1981
HAL	Oosterdam	5522	96%	214	4%	0.00%	0	0%				
HAL	Rotterdam	5321	93%	415	7%	1.02%	66	0%				
HAL	Veendam	5171	90%	565	10%	3.95%	86	0%				
HAL	Volendam	4363	76%	1373	0%	83.58%	499	24%	0.67%	199	21.23%	6257
HAL	Westerdam	3805	66%	1931	6%	5.23%	121	28%	0.18%	84	3.34%	1520
HAL	Zaandam	4261	74%	1475	5%	5.80%	370	21%	0.08%	19	1.43%	338
HAL	Zuiderdam	5614	98%	122	2%	0.49%	10	0%				
PCL	Caribbean PR	5305	92%	431	8%	0.00%	0	0%				
PCL	Coral PR	3968	69%	1768	2%	33.33%	4	29%	2.41%	601	56.92%	14219
PCL	Crown PR	5592	97%	144	3%	9.17%	172	0%				
PCL	Emerald PR	4268	74%	1468	8%	18.35%	1653	17%	3.87%	890	29.43%	6777
PCL	Golden PR	4138	72%	1598	0%			28%	0.26%	46	4.90%	870
PCL	Grand PR	4358	76%	1378	10%	65.25%	199	14%	3.27%	888	31.74%	8627
PCL	Island PR	3987	70%	1749	1%	0.00%	0	29%	1.00%	297	22.96%	6807
PCL	Regal PR	5471	95%	265	5%	0.02%	1	0%				
PCL	Royal PR	5461	95%	275	5%	0.85%	27	0%				
PCL	Ruby PR	3688	64%	2048	13%	22.89%	1861	23%	0.47%	116	20.63%	5044
PCL	Star PR	4006	70%	1730	1%	6.35%	39	29%	0.84%	298	19.82%	7048

Notes

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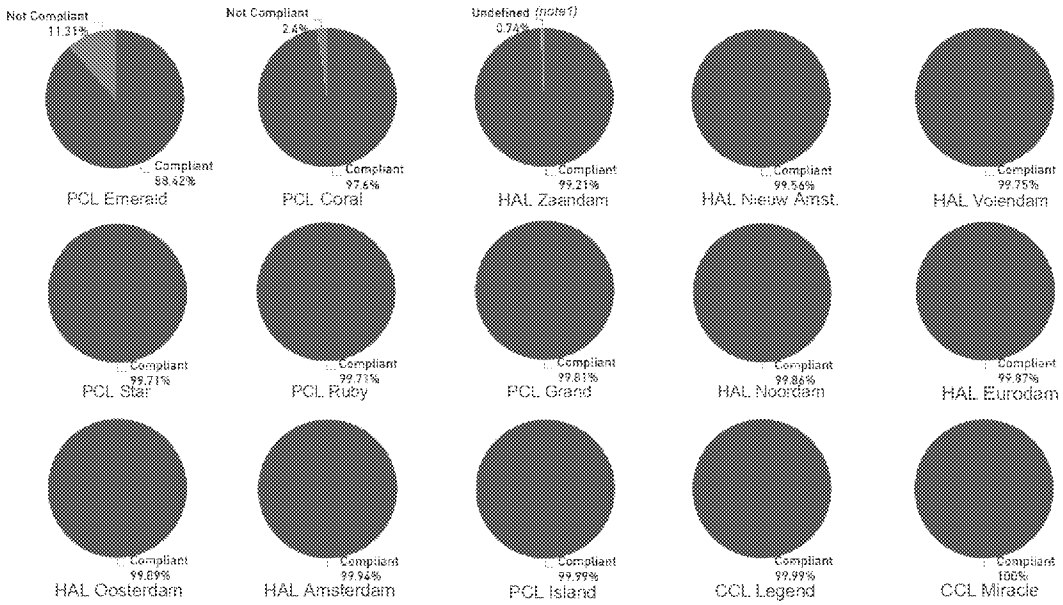
Back-up slides

Deviation Analysis -- Fleet Summary

Alaska June-October 2017

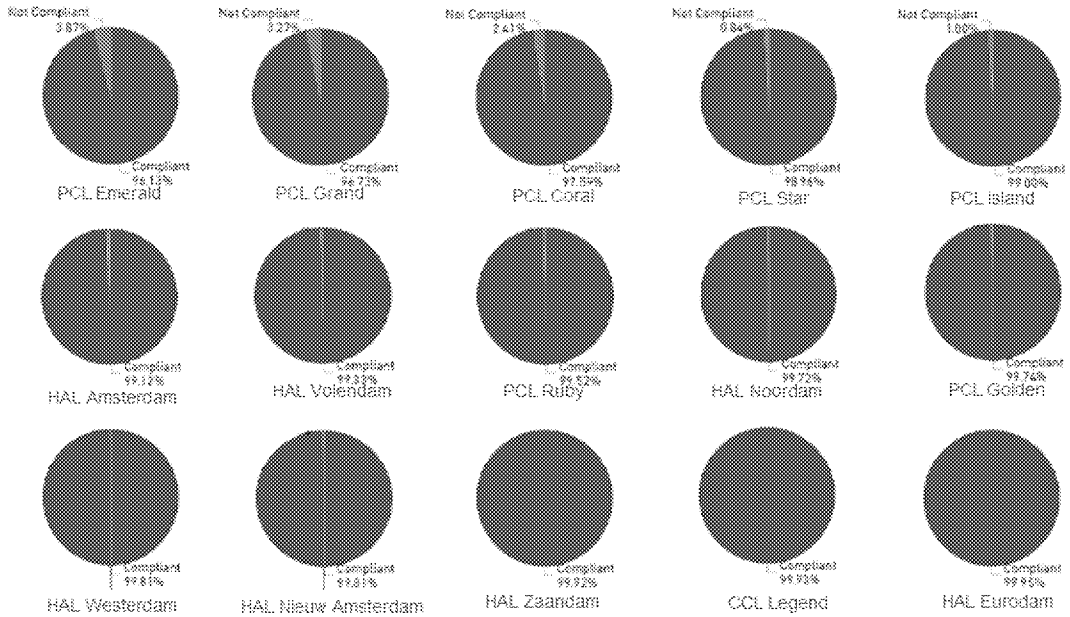


Notes

1. Unexpected/undefined values (pH<0.5 and pH>14) are not considered as not compliant
2. AOC rules implemented are reported in the back-up slides as a reference
3. Analysis made on all the data available through Neptune

Deviation Analysis -- Fleet Summary

Alaska 2018 – data up to the 27th of August



Notes

1. Unexpected/undefined values (pH<0.5 and pH>14) are not considered as not compliant
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3. Analysis made on all the data available through Neptune

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EGCS pH and Flowrate Report, Tables a. & b.

Diagram of the Regulations

EPS requires the identification of the pH and flowrate readings that exceed:

1. VGP's 6.0 pH discharge limit
2. 2017 Interim Effluent limit
3. Allowance for a 2.0 difference between inlet and outlet

Water Rack3 at Overboard Discharge: pH [pH] → pH_Differential	pH>=6.0	5.7<=pH<6.0	5.5<=pH<5.7	pH<5.5	pH NA
Inlet and Outlet pH difference <= 2.0	**CASE 1**: OK, for VGP limit	**CASE 2**: OK, for Interim Effluent limit	**CASE 3**: OK, for pH delta allowance		CASE 6 Undefined
Inlet and Outlet pH difference > 2.0			**CASE 4a or 4b**: Only 48 readings per day (10% of the time during each calendar day) can be considered OK for the Interim Effluent limit *	CASE 5 NOT OK	
Not available Inlet and Outlet pH difference					

CASE 4 detail:

- The calendar day will be considered as the Alaska Local time calendar day
- As convention, in case of more than 48 readings per day, the first 48 readings will be considered OK, the following NOT OK.

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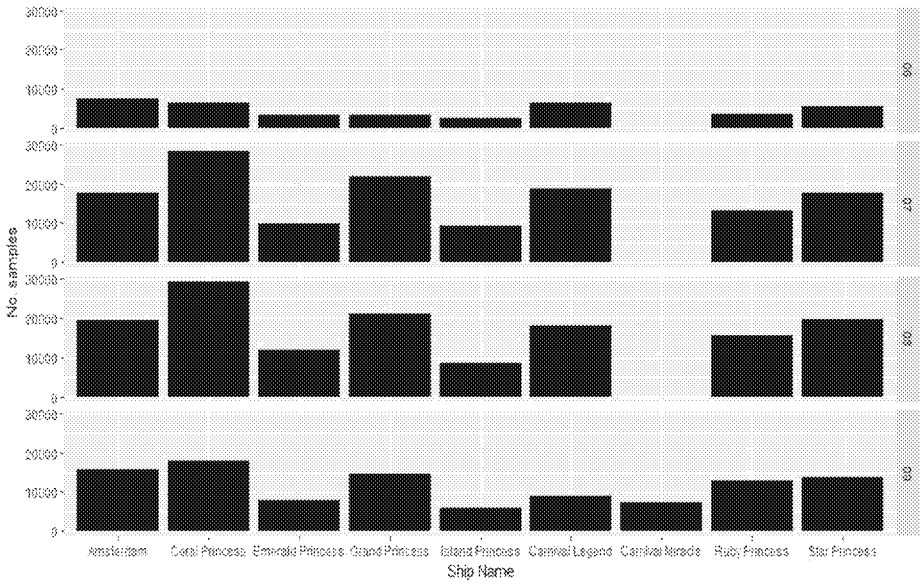
Carnival Legend

Dixon entrance

- In 2017 a number of "not compliant" events were recorded for Legend (only) inside the wrong boundaries of Dixon Bay. Details are provided in an Excel attachment.
- New correct boundaries are now available in Neptune software and recalculation with new borders will be done on the 2018 data.

No. total observations per ship per month*



*Total number of observations per ship with washwater pH readings recorded after the buffer pump (considered to be pH at point of discharge) and washwater pH readings before the scrubber tower ≤ 14. Some readings were >1000 pH units, perhaps measurement or human error, because pH scale ranges from 0 to 14.

Number of monitoring records exceeding pH limits per vessel

Vessel Name	pH < 6.0	pH < 5.7	pH < 5.5	pH differential > 2.0
Amsterdam (60126)*	416	211	11	19
Coral Princess (81966)	15679	5420	4313	0
Emerald Princess (32985)	11481	4851	2314	1
Grand Princess (60828)	788	264	218	9497
Island Princess (26324)	216	13	2	2441
Carnival Legend (51993)	1981	36	3	3
Carnival Miracle (7233)	29	0	0	0
Ruby Princess (45222)	5936	1640	707	1
Star Princess (56544)	311	52	26	0

*Total number of monitoring records per vessel

Ship	Ambient pH	pH at Overboard	pH at 2m from ship	pH at 4m from ship	Witnessing Authority
Carnival Pride	8.2	4.3	8.2	8.2	Lloyds Register
Costa Fascinosa	8.3	4.0	8.2	8.3	RINA
AIDAmar	8.3	4.7	7.9	8.3	DNVGL
Westerdam	8.2	2.9	8.2	8.2	Lloyds Register

Carnival Costa P&O P&O CRUISES PRINCESS CRUISES

Holland America Line AIDA CUNARD SEABOURN fathom

U.S. Environmental Protection Agency
Administrative Order on Consent
of 07 May, 2019

Annual Reporting, Section IV.C.2.
Characterization of Voyages

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IV.C. Annual Reporting

2. Characterization of Voyages of the Covered Cruise Ships that operated in Alaska during the 2019 sailing season (through September 30).

This report includes:

a. Characterization of each vessel's Alaska cruise itinerary, voyage duration, and amount of time spent in: (1) U.S. VGP waters in Alaska; (2) Alaskan ECA waters outside the VGP; (3) U.S. VGP waters outside Alaska, (4) in U.S. ports in Alaska, and (5) U.S. ports outside Alaska; (6) in any area within U.S. waters identified in Appendix G of the 2013 VGP and not otherwise included in item (4).

b. Characterization of time during the voyage where engines were powered by (l) low sulfur fuel oil or (2) high sulfur fuel oil combined with EGCSs and an explanation of the decision-making criteria for selection of the fuel source used, including how the different locations identified in IV.C.2.a. of the 2019 AOC are considered in this process.

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IV.C. Annual Reporting

2. Characterization of Voyages of the Covered Cruise Ships that operated in Alaska during the 2019 sailing season (through September 30).

This report includes:

a. Characterization of each vessel's Alaska cruise itinerary, voyage duration, and amount of time spent in: (1) U.S. VGP waters in Alaska; (2) Alaskan ECA waters outside the VGP; (3) U.S. VGP waters outside Alaska, (4) in U.S. ports in Alaska, and (5) U.S. ports outside Alaska; (6) in any area within U.S. waters identified in Appendix G of the 2013 VGP and not otherwise included in item (4).

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IV.C.2.a. Analysis of the Ship Hours for the Alaska Itineraries

HAL Amsterdam, HAL Eurodam, HAL Maasdam

				IV.C.2.a. - Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
HAL Amsterdam	H-AM_20190603	14	14d_SEATTLE - SEATTLE	58.6	84.9	15.5	79.2	9.5	1.7	1.2%
HAL Amsterdam	H-AM_20190617	14	14d_SEATTLE - SEATTLE	60.3	85.6	14.6	79.1	9.8	2.5	0.0%
HAL Amsterdam	H-AM_20190701	7	7d_SEATTLE - SEATTLE	33.5	15.3	14.3	26.9	9.7	1.0	0.1%
HAL Amsterdam	H-AM_20190708	7	7d_SEATTLE - SEATTLE	30.8	17.5	13.9	26.9	9.7	1.1	0.2%
HAL Amsterdam	H-AM_20190715	14	14d_SEATTLE - SEATTLE	59.3	87.1	14.1	79.8	9.4	2.1	0.1%
HAL Amsterdam	H-AM_20190729	14	14d_SEATTLE - SEATTLE	46.2	66.9	14.5	55.8	9.5	2.2	19.7%
HAL Amsterdam	H-AM_20190812	14	14d_SEATTLE - SEATTLE	60.8	87.7	14.6	77.9	9.4	2.1	0.3%
HAL Amsterdam	H-AM_20190826	14	14d_SEATTLE - SEATTLE	61.0	88.2	14.0	78.2	9.5	2.1	0.0%
HAL Amsterdam	H-AM_20190909	14	14d_SEATTLE - SEATTLE	65.7	85.7	14.1	78.4	8.8	2.1	0.8%
HAL Eurodam	H-EU_20190504	7	7d_SEATTLE - SEATTLE	39.7	21.5	12.2	26.7	8.6	11.9	0.1%
HAL Eurodam	H-EU_20190511	7	7d_SEATTLE - SEATTLE	40.2	20.9	12.1	20.7	11.4	11.7	3.9%
HAL Eurodam	H-EU_20190518	7	7d_SEATTLE - SEATTLE	40.2	22.5	12.1	26.0	10.9	12.0	0.1%
HAL Eurodam	H-EU_20190525	7	7d_SEATTLE - SEATTLE	39.8	22.4	11.6	26.3	11.0	11.8	0.1%
HAL Eurodam	H-EU_20190601	7	7d_SEATTLE - SEATTLE	40.1	22.2	11.7	26.4	11.1	13.3	0.1%
HAL Eurodam	H-EU_20190608	7	7d_SEATTLE - SEATTLE	39.7	21.4	11.5	26.7	10.7	13.2	0.1%
HAL Eurodam	H-EU_20190615	7	7d_SEATTLE - SEATTLE	39.3	22.3	11.8	27.5	10.9	13.2	0.0%
HAL Eurodam	H-EU_20190622	7	7d_SEATTLE - SEATTLE	29.5	17.6	9.1	20.2	11.3	12.8	26.6%
HAL Eurodam	H-EU_20190629	7	7d_SEATTLE - SEATTLE							100.0%
HAL Eurodam	H-EU_20190706	7	7d_SEATTLE - SEATTLE	33.9	14.4	2.3	23.3		13.6	42.9%
HAL Eurodam	H-EU_20190713	7	7d_SEATTLE - SEATTLE	38.7	23.3	11.2	26.6	11.0	12.8	0.1%
HAL Eurodam	H-EU_20190720	7	7d_SEATTLE - SEATTLE	38.2	23.4	10.9	27.2	10.8	0.9	0.1%
HAL Eurodam	H-EU_20190727	7	7d_SEATTLE - SEATTLE	38.7	22.5	12.5	27.0	10.8	12.6	0.1%
HAL Eurodam	H-EU_20190803	7	7d_SEATTLE - SEATTLE	39.2	22.4	12.0	26.7	11.2	13.1	0.0%
HAL Eurodam	H-EU_20190810	7	7d_SEATTLE - SEATTLE	38.5	22.7	11.7	26.9	11.5	12.8	0.0%
HAL Eurodam	H-EU_20190817	7	7d_SEATTLE - SEATTLE	39.3	20.3	10.3	28.7	10.8	12.7	0.0%
HAL Eurodam	H-EU_20190824	7	7d_SEATTLE - SEATTLE	28.8	24.5	14.2	23.3	10.7	13.0	0.0%
HAL Eurodam	H-EU_20190831	7	7d_SEATTLE - SEATTLE	40.2	19.7	12.1	28.7	10.3	14.2	0.2%
HAL Eurodam	H-EU_20190907	7	7d_SEATTLE - SEATTLE	39.6	22.0	10.8	26.6	11.0	13.8	0.3%
HAL Eurodam	H-EU_20190914	7	7d_SEATTLE - SEATTLE	40.0	20.0	11.9	27.9	10.8	13.8	0.2%
HAL Eurodam	H-EU_20190921	7	7d_SEATTLE - SEATTLE	39.8	18.0	11.6	31.0	10.0	13.3	0.2%
HAL Maasdam	H-MS_20190507	21	21d_SAN FRANCISCO-SAN FRANCISCO	107.4	78.3	4.5	83.1	21.7	10.9	3.1%
HAL Maasdam	H-MS_20190528	21	21d_SAN FRANCISCO-SAN FRANCISCO	120.3	87.3	5.3	83.1	20.3	16.9	0.7%
HAL Maasdam	H-MS_20190618	21	21d_SAN FRANCISCO-SAN FRANCISCO	4.2	0.3	2.0	7.7	10.3	15.3	79.3%
HAL Maasdam	H-MS_20190709	22	22d_SAN FRANCISCO-YOKOHAMA	26.5	77.0	17.9	38.0	19.6	16.7	0.3%

"MARSAN" = Marine Sanctuaries in U.S. waters

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IV.C.2.a. Analysis of the Ship Hours for the Alaska Itineraries

HAL Nieuw Amsterdam

				IV.C.2.a - Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
HAL N.Amsterdam	H-NA_20190504	7	7d_VANCOUVER - VANCOUVER	45.9	17.5	2.4	31.4		11.3	0.1%
HAL N.Amsterdam	H-NA_20190511	7	7d_VANCOUVER - VANCOUVER	42.3	16.6		25.9		10.8	12.2%
HAL N.Amsterdam	H-NA_20190518	7	7d_VANCOUVER - VANCOUVER	44.6	17.3		33.1		10.7	0.1%
HAL N.Amsterdam	H-NA_20190525	7	7d_VANCOUVER - VANCOUVER	45.9	18.3		32.5		10.5	0.0%
HAL N.Amsterdam	H-NA_20190601	7	7d_VANCOUVER - VANCOUVER	45.8	17.9		33.4		11.0	0.0%
HAL N.Amsterdam	H-NA_20190608	7	7d_VANCOUVER - VANCOUVER	44.7	18.1		34.1		11.2	0.1%
HAL N.Amsterdam	H-NA_20190615	7	7d_VANCOUVER - VANCOUVER	45.4	18.5		33.6		11.0	0.0%
HAL N.Amsterdam	H-NA_20190622	7	7d_VANCOUVER - VANCOUVER	45.8	18.2		33.3		11.3	0.0%
HAL N.Amsterdam	H-NA_20190629	7	7d_VANCOUVER - VANCOUVER	45.5	19.2		31.9		11.0	0.1%
HAL N.Amsterdam	H-NA_20190706	7	7d_VANCOUVER - VANCOUVER	45.9	16.8		31.7		11.0	0.1%
HAL N.Amsterdam	H-NA_20190713	7	7d_VANCOUVER - VANCOUVER	46.6	19.1		31.0		11.1	0.4%
HAL N.Amsterdam	H-NA_20190720	7	7d_VANCOUVER - VANCOUVER	46.2	17.2		31.2		10.8	0.1%
HAL N.Amsterdam	H-NA_20190727	7	7d_VANCOUVER - VANCOUVER	44.8	17.3		32.6		10.8	0.1%
HAL N.Amsterdam	H-NA_20190803	7	7d_VANCOUVER - VANCOUVER	45.2	17.4		32.7		11.0	0.1%
HAL N.Amsterdam	H-NA_20190810	7	7d_VANCOUVER - VANCOUVER	45.4	17.2		32.8		11.2	0.1%
HAL N.Amsterdam	H-NA_20190817	7	7d_VANCOUVER - VANCOUVER	45.9	16.8		32.7		11.4	0.0%
HAL N.Amsterdam	H-NA_20190824	7	7d_VANCOUVER - VANCOUVER	46.1	18.7		31.9		10.9	0.0%
HAL N.Amsterdam	H-NA_20190831	7	7d_VANCOUVER - VANCOUVER	46.8	17.7		32.4		11.1	0.1%
HAL N.Amsterdam	H-NA_20190907	7	7d_VANCOUVER - VANCOUVER	45.3	17.9		32.1		10.1	0.1%
HAL N.Amsterdam	H-NA_20190914	7	7d_VANCOUVER - VANCOUVER	46.1	17.8		31.5		10.7	0.0%
HAL N.Amsterdam	H-NA_20190921	7	7d_VANCOUVER - VANCOUVER	45.3	18.4		31.9		10.3	0.1%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC

IV.C.2.a. Analysis of the Ship Hours for the Alaska Itineraries

HAL Noordam

				IV.C.2.a - Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
HAL Noordam	H-NO_20190512	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	49.0	25.6	5.1	36.0		13.2	0.1%
HAL Noordam	H-NO_20190519	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	55.1	45.5		49.6		12.5	0.0%
HAL Noordam	H-NO_20190526	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	49.2	23.9		37.6		11.8	0.0%
HAL Noordam	H-NO_20190602	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	53.9	46.2		50.1		12.7	0.0%
HAL Noordam	H-NO_20190609	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	49.2	25.1		35.6		11.8	2.3%
HAL Noordam	H-NO_20190616	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	55.0	44.9		50.4		12.7	0.1%
HAL Noordam	H-NO_20190623	7	7d_VANCOUVER - SEWARD (ANCHORAGE)							83.8%
HAL Noordam	H-NO_20190630	7	7d_SEWARD (ANCHORAGE) - VANCOUVER							100.0%
HAL Noordam	H-NO_20190707	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	49.1	24.2		38.0		12.1	26.2%
HAL Noordam	H-NO_20190714	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	54.4	45.2		50.9		12.4	0.0%
HAL Noordam	H-NO_20190721	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	48.7	24.4		37.6		12.7	0.0%
HAL Noordam	H-NO_20190728	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	53.9	45.4		51.0		12.4	0.2%
HAL Noordam	H-NO_20190804	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	48.2	23.5		37.1		12.3	0.3%
HAL Noordam	H-NO_20190811	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	54.2	45.4		50.6		13.3	0.1%
HAL Noordam	H-NO_20190818	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	48.7	23.6		36.9		11.8	0.1%
HAL Noordam	H-NO_20190825	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	54.2	45.2		50.8		13.5	0.1%
HAL Noordam	H-NO_20190901	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	48.2	24.6		37.4		12.1	0.1%
HAL Noordam	H-NO_20190908	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	54.3	45.6		49.2		13.2	0.8%
HAL Noordam	H-NO_20190915	7	7d_VANCOUVER - VANCOUVER	48.1	12.2		36.7		10.1	0.0%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC

IV.C.2.a. Analysis of the Ship Hours for the Alaska Itineraries

HAL Oosterdam

				IV.C.2.a - Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
HAL Oosterdam	H-OO_20190505	7	7d_SEATTLE - SEATTLE	33.4	32.4	14.2	21.9	9.5	2.1	0.3%
HAL Oosterdam	H-OO_20190512	7	7d_SEATTLE - SEATTLE	32.7	32.9	11.9	21.9	9.8	2.0	0.5%
HAL Oosterdam	H-OO_20190519	7	7d_SEATTLE - SEATTLE	33.0	32.5	12.6	22.5	9.7	2.1	0.0%
HAL Oosterdam	H-OO_20190526	7	7d_SEATTLE - SEATTLE	33.3	32.4	12.5	22.5	10.0	2.0	0.1%
HAL Oosterdam	H-OO_20190602	7	7d_SEATTLE - SEATTLE	34.4	31.2	12.4	22.5	10.3	2.1	0.1%
HAL Oosterdam	H-OO_20190609	7	7d_SEATTLE - SEATTLE	32.8	33.0	11.5	22.5	10.4	1.9	1.0%
HAL Oosterdam	H-OO_20190616	7	7d_SEATTLE - SEATTLE	32.6	32.5	12.6	22.9	10.1	1.8	0.1%
HAL Oosterdam	H-OO_20190623	7	7d_SEATTLE - SEATTLE	33.9	31.2	12.4	23.6	9.8	1.8	0.1%
HAL Oosterdam	H-OO_20190630	7	7d_SEATTLE - SEATTLE	31.9	33.8	12.2	22.7	10.0	1.7	0.1%
HAL Oosterdam	H-OO_20190707	7	7d_SEATTLE - SEATTLE	34.9	30.7	12.5	22.8	9.9	2.0	0.1%
HAL Oosterdam	H-OO_20190714	7	7d_SEATTLE - SEATTLE	33.5	32.8	12.3	22.3	10.1	1.8	0.0%
HAL Oosterdam	H-OO_20190721	7	7d_SEATTLE - SEATTLE	34.5	30.9	12.7	23.2	9.8	2.0	0.1%
HAL Oosterdam	H-OO_20190728	7	7d_SEATTLE - SEATTLE	32.7	32.8	12.4	23.1	9.7	1.8	0.1%
HAL Oosterdam	H-OO_20190804	7	7d_SEATTLE - SEATTLE	34.0	31.5	12.5	22.8	10.1	1.6	0.1%
HAL Oosterdam	H-OO_20190811	7	7d_SEATTLE - SEATTLE	33.8	32.1	11.9	23.1	9.8	1.9	0.1%
HAL Oosterdam	H-OO_20190818	7	7d_SEATTLE - SEATTLE	33.3	33.2	12.6	22.4	10.1	1.9	0.1%
HAL Oosterdam	H-OO_20190825	7	7d_SEATTLE - SEATTLE	33.2	33.1	11.9	22.2	9.7	2.0	0.1%
HAL Oosterdam	H-OO_20190901	7	7d_SEATTLE - SEATTLE	34.1	31.8	12.4	22.6	9.7	1.9	0.0%
HAL Oosterdam	H-OO_20190908	7	7d_SEATTLE - SEATTLE	32.2	32.7	12.3	22.9	9.9	1.9	0.1%
HAL Oosterdam	H-OO_20190915	7	7d_SEATTLE - SEATTLE	33.9	32.0	12.0	22.3	10.0	2.0	0.0%
HAL Oosterdam	H-OO_20190922	7	7d_SEATTLE - SEATTLE	33.7	32.3	12.1	22.9	9.8	1.8	0.0%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC

IV.C.2.a. Analysis of the Ship Hours for the Alaska Itineraries

HAL Volendam

				IV.C.2.a. Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
HAL Volendam	H-VO_20190508	7	7d_VANCOUVER - VANCOUVER	50.6	13.0	3.1	31.9		9.6	0.0%
HAL Volendam	H-VO_20190515	7	7d_VANCOUVER - VANCOUVER	50.5	13.0		32.1		9.6	0.1%
HAL Volendam	H-VO_20190522	7	7d_VANCOUVER - VANCOUVER	28.7	12.6		23.2			18.8%
HAL Volendam	H-VO_20190529	7	7d_VANCOUVER - VANCOUVER	50.4	12.5		32.6		9.7	0.0%
HAL Volendam	H-VO_20190605	7	7d_VANCOUVER - VANCOUVER	50.9	11.2		32.5		9.7	0.0%
HAL Volendam	H-VO_20190612	7	7d_VANCOUVER - VANCOUVER	49.3	11.7		30.0		9.5	0.7%
HAL Volendam	H-VO_20190619	7	7d_VANCOUVER - VANCOUVER	48.5	11.3		34.2		9.8	0.0%
HAL Volendam	H-VO_20190626	7	7d_VANCOUVER - VANCOUVER	50.3	11.8		33.3		9.8	0.1%
HAL Volendam	H-VO_20190703	7	7d_VANCOUVER - VANCOUVER	51.0	12.2		32.0		10.1	0.0%
HAL Volendam	H-VO_20190710	7	7d_VANCOUVER - VANCOUVER	50.1	12.6		32.5		9.9	0.5%
HAL Volendam	H-VO_20190717	7	7d_VANCOUVER - VANCOUVER	50.6	12.0		33.2		10.1	0.0%
HAL Volendam	H-VO_20190724	7	7d_VANCOUVER - VANCOUVER	51.5	11.4		32.5		9.6	0.1%
HAL Volendam	H-VO_20190731	7	7d_VANCOUVER - VANCOUVER	51.2	11.4		32.8		9.8	0.0%
HAL Volendam	H-VO_20190807	7	7d_VANCOUVER - VANCOUVER	50.6	12.3		32.6		9.8	0.0%
HAL Volendam	H-VO_20190814	7	7d_VANCOUVER - VANCOUVER	50.1	12.7		32.9		10.1	0.3%
HAL Volendam	H-VO_20190821	7	7d_VANCOUVER - VANCOUVER	50.7	12.2		33.0		9.9	0.0%
HAL Volendam	H-VO_20190828	7	7d_VANCOUVER - VANCOUVER	50.2	12.0		32.3		10.1	0.2%
HAL Volendam	H-VO_20190904	7	7d_VANCOUVER - VANCOUVER	51.4	12.2		32.3		9.5	0.1%
HAL Volendam	H-VO_20190911	7	7d_VANCOUVER - VANCOUVER	50.6	12.0		31.7		9.8	0.4%
HAL Volendam	H-VO_20190918	7	7d_VANCOUVER - VANCOUVER	51.9	10.5		31.9		9.6	0.1%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC

IV.C.2.a. Analysis of the Ship Hours for the Alaska Itineraries

HAL Westerdam

				IV.C.2.a - Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
HAL Westerdam	H-WE_20190428	14	15d_YOKOHAMA (TOKYO) - VANCOUVER	25.6	26.3		28.7		1.2	0.0%
HAL Westerdam	H-WE_20190512	7	7d_VANCOUVER - VANCOUVER	47.0	16.5		33.7		10.1	0.6%
HAL Westerdam	H-WE_20190519	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	48.7	24.2		37.0		13.3	0.0%
HAL Westerdam	H-WE_20190526	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	53.4	45.2		51.8		14.2	0.1%
HAL Westerdam	H-WE_20190602	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	49.5	24.9		38.8		12.5	0.0%
HAL Westerdam	H-WE_20190609	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	53.8	45.5		51.2		13.0	0.1%
HAL Westerdam	H-WE_20190616	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	48.6	25.3		37.0		12.7	0.0%
HAL Westerdam	H-WE_20190623	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	52.7	45.7		52.1		13.3	0.0%
HAL Westerdam	H-WE_20190630	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	48.8	25.6		36.8		12.5	0.0%
HAL Westerdam	H-WE_20190707	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	53.3	45.1		51.9		13.3	0.1%
HAL Westerdam	H-WE_20190714	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	50.6	26.0		37.1		12.4	0.0%
HAL Westerdam	H-WE_20190721	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	54.7	44.9		50.9		13.4	0.0%
HAL Westerdam	H-WE_20190728	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	48.4	24.8		36.6		12.8	0.0%
HAL Westerdam	H-WE_20190804	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	53.1	44.7		52.4		13.1	0.1%
HAL Westerdam	H-WE_20190811	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	49.0	24.7		36.3		12.3	0.0%
HAL Westerdam	H-WE_20190818	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	54.6	45.7		50.0		13.4	0.1%
HAL Westerdam	H-WE_20190825	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	48.6	25.1		36.3		12.1	0.0%
HAL Westerdam	H-WE_20190901	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	54.2	44.6		51.2		13.5	0.1%
HAL Westerdam	H-WE_20190908	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	51.1	22.4		36.5		14.1	0.1%
HAL Westerdam	H-WE_20190915	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	54.9	44.6		50.8		14.2	0.0%
HAL Westerdam	H-WE_20190922	7	7d_VANCOUVER - VANCOUVER	47.7	12.4		35.1			0.1%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC

IV.C.2.a. Analysis of the Ship hours for the Alaska itineraries

Carnival Legend, Cunard Queen Elizabeth

				IV.C.2.a - Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
CCL Legend	K-LE_20190429	7	7d_VANCOUVER-SEATTLE	43.1	17.1	6.9	32.2		11.8	0.4%
CCL Legend	K-LE_20190506	8	7d_SEATTLE-SEATTLE	53.1	20.1	15.8	39.2	10.3	14.7	0.1%
CCL Legend	K-LE_20190514	7	7d_SEATTLE-SEATTLE	35.4	16.9	11.3	20.1	10.4	11.5	9.6%
CCL Legend	K-LE_20190521	7	7d_SEATTLE-SEATTLE	41.9	15.9	12.9	30.2	9.9	11.8	0.0%
CCL Legend	K-LE_20190528	7	7d_SEATTLE-SEATTLE	21.7	13.8	11.8	12.5	9.7	0.9	23.9%
CCL Legend	K-LE_20190604	7	7d_SEATTLE-SEATTLE	44.1	14.0	13.0	29.8	9.5	1.0	0.0%
CCL Legend	K-LE_20190611	7	7d_SEATTLE-SEATTLE	45.3	12.1	12.4	30.0	9.4	0.8	0.1%
CCL Legend	K-LE_20190618	7	7d_SEATTLE-SEATTLE	44.9	13.9	12.8	29.4	9.5	1.0	0.0%
CCL Legend	K-LE_20190625	7	7d_SEATTLE-SEATTLE	44.9	14.2	12.9	29.0	9.4	0.9	0.1%
CCL Legend	K-LE_20190702	7	7d_SEATTLE-SEATTLE	43.7	13.8	12.7	30.5	9.9	0.9	0.0%
CCL Legend	K-LE_20190709	7	7d_SEATTLE-SEATTLE	45.4	13.9	12.3	28.8	9.4	0.9	0.1%
CCL Legend	K-LE_20190716	7	7d_SEATTLE-SEATTLE	45.8	13.0	12.6	28.6	9.5	0.9	0.0%
CCL Legend	K-LE_20190723	7	7d_SEATTLE-SEATTLE	41.1	3.5	12.7	27.3	9.4	10.6	16.3%
CCL Legend	K-LE_20190730	7	7d_SEATTLE-SEATTLE	44.1	14.3	12.9	29.5	9.5	1.0	0.1%
CCL Legend	K-LE_20190806	7	7d_SEATTLE-SEATTLE	45.2	4.3	12.0	29.3	9.5	0.9	12.4%
CCL Legend	K-LE_20190813	7	7d_SEATTLE-SEATTLE	44.9	14.0	12.4	29.4	9.4	1.0	0.0%
CCL Legend	K-LE_20190820	7	7d_SEATTLE-SEATTLE	45.2	13.3	12.8	28.9	9.4	1.1	0.0%
CCL Legend	K-LE_20190827	7	7d_SEATTLE-SEATTLE	44.8	14.5	12.6	28.8	9.6	0.9	0.0%
CCL Legend	K-LE_20190903	7	7d_SEATTLE-SEATTLE	47.1	11.6	12.9	29.1	9.6	10.5	0.0%
CCL Legend	K-LE_20190910	7	7d_SEATTLE-VANCOUVER	45.4	13.9	10.1	35.8	9.5		0.0%
CCL Legend	K-LE_20190917	9	9d_VANCOUVER-VANCOUVER	62.4	26.0	0.7	54.2		13.5	0.1%
CUK Q. Elizabeth	N-QE_20190505	26	26d_YOKOHAMA-VANCOUVER	82.6	80.1	3.5	79.9		5.7	0.0%
CUK Q. Elizabeth	N-QE_20190531	10	10d_VANCOUVER-VANCOUVER	51.9	40.2	7.1	50.0		4.6	0.2%
CUK Q. Elizabeth	N-QE_20190610	10	10d_VANCOUVER-VANCOUVER	45.0	43.4	8.7	51.3		2.1	0.0%
CUK Q. Elizabeth	N-QE_20190620	10	10d_VANCOUVER-VANCOUVER	44.0	43.4	7.1	52.3		2.0	0.1%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC.

IV.C.2.a. Analysis of the Ship Hours for the Alaska Itineraries

Grand Princess, Coral Princess

				IV.C.2.a - Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
PCL Grand	P-AP_20190506	10	10d_SAN FRANCISCO-SAN FRANCISCO	50.5	8.9	9.8	34.3		26.3	2.6%
PCL Grand	P-AP_20190516	10	10d_SAN FRANCISCO-SAN FRANCISCO	45.1	23.0	5.0	27.3	9.2	16.3	0.0%
PCL Grand	P-AP_20190526	10	10d_SAN FRANCISCO-SAN FRANCISCO	43.7	10.0	5.2	37.5	9.7	16.5	0.0%
PCL Grand	P-AP_20190605	10	10d_SAN FRANCISCO-SAN FRANCISCO	41.6	10.1	5.5	31.5	9.5	17.3	3.9%
PCL Grand	P-AP_20190615	10	10d_SAN FRANCISCO-SAN FRANCISCO	42.9	10.2	5.1	37.8	9.7	16.3	0.3%
PCL Grand	P-AP_20190625	10	10d_SAN FRANCISCO-SAN FRANCISCO	40.1	24.7	5.3	31.6	9.6	23.9	3.4%
PCL Grand	P-AP_20190705	10	10d_SAN FRANCISCO-SAN FRANCISCO	33.6	9.9	3.5	24.3		1.3	43.5%
PCL Grand	P-AP_20190715	10	10d_SAN FRANCISCO-SAN FRANCISCO	16.0	6.3	1.2	9.7	9.6	10.7	42.1%
PCL Grand	P-AP_20190725	10	10d_SAN FRANCISCO-SAN FRANCISCO		4.6	2.1		9.6	15.3	64.7%
PCL Grand	P-AP_20190604	10	10d_SAN FRANCISCO-SAN FRANCISCO	24.6	0.9		27.0			64.8%
PCL Grand	P-AP_20190614	10	10d_SAN FRANCISCO-SAN FRANCISCO	27.1	3.0	5.0	33.5	9.4	16.7	13.8%
PCL Grand	P-AP_20190824	10	10d_SAN FRANCISCO-SAN FRANCISCO	44.5	10.5	5.9	37.3	10.2	16.1	0.1%
PCL Grand	P-AP_20190903	10	10d_SAN FRANCISCO-SAN FRANCISCO	38.1	23.8	5.6	31.9	9.7	26.3	0.0%
PCL Grand	P-AP_20190913	10	10d_SAN FRANCISCO-SAN FRANCISCO	38.0	20.3	4.7	35.0	9.5	17.3	0.0%
PCL Coral	P-CO_20190508	7	7d_VANCOUVER-VANCOUVER	46.3	16.7	5.3	27.7		13.2	0.0%
PCL Coral	P-CO_20190515	7	7d_VANCOUVER-WHITTIER	52.7	22.7		35.4		12.8	0.0%
PCL Coral	P-CO_20190522	7	7d_WHITTIER- VANCOUVER	70.7	27.5		51.0		12.1	0.1%
PCL Coral	P-CO_20190529	7	7d_VANCOUVER-WHITTIER	54.3	20.7		35.5		10.9	0.0%
PCL Coral	P-CO_20190605	7	7d_WHITTIER- VANCOUVER	70.5	25.9		53.1		11.9	0.0%
PCL Coral	P-CO_20190612	7	7d_VANCOUVER-WHITTIER	52.8	21.3		36.3		10.5	0.1%
PCL Coral	P-CO_20190619	7	7d_WHITTIER- VANCOUVER	70.5	26.6		52.1		12.0	0.1%
PCL Coral	P-CO_20190626	7	7d_VANCOUVER-WHITTIER	54.0	20.5		36.1		10.8	0.0%
PCL Coral	P-CO_20190703	7	7d_WHITTIER- VANCOUVER	71.6	25.9		51.8		12.2	0.0%
PCL Coral	P-CO_20190710	7	7d_VANCOUVER-WHITTIER	53.9	20.6		35.9		11.0	0.0%
PCL Coral	P-CO_20190717	7	7d_WHITTIER- VANCOUVER	70.8	26.3		52.1		12.0	0.0%
PCL Coral	P-CO_20190724	7	7d_VANCOUVER-WHITTIER	52.9	21.1		36.4		10.6	0.0%
PCL Coral	P-CO_20190731	7	7d_WHITTIER- VANCOUVER	71.6	26.2		52.6		12.2	0.0%
PCL Coral	P-CO_20190807	7	7d_VANCOUVER-WHITTIER	52.0	21.4		36.9		11.0	2.7%
PCL Coral	P-CO_20190814	7	7d_WHITTIER- VANCOUVER	71.3	25.5		52.8		12.1	0.1%
PCL Coral	P-CO_20190821	7	7d_VANCOUVER-WHITTIER	53.1	21.0		36.5		10.8	0.0%
PCL Coral	P-CO_20190828	7	7d_WHITTIER- VANCOUVER	70.3	26.1		53.3		12.0	0.0%
PCL Coral	P-CO_20190904	7	7d_VANCOUVER-WHITTIER	53.9	20.5		36.0		11.5	0.0%
PCL Coral	P-CO_20190911	7	7d_WHITTIER- VANCOUVER	70.8	26.1		52.1		11.6	0.0%
PCL Coral	P-CO_20190918	7	7d_VANCOUVER-VANCOUVER	53.3	10.2	0.1	24.1		9.5	0.0%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC

IV.C.2.a. Analysis of the Ship Hours for the Alaska Itineraries

Island Princess

				IV.C.2.a. Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
PCL Island	P-IP_20190501	7	7d_VANCOUVER-VANCOUVER	18.8	16.5	3.2	8.6		7.9	30.7%
PCL Island	P-IP_20190508	7	7d_VANCOUVER-WHITTIER	50.2	25.0		36.0		11.0	0.1%
PCL Island	P-IP_20190515	7	7d_WHITTIER- VANCOUVER	69.9	26.4		52.8		11.8	0.3%
PCL Island	P-IP_20190522	7	7d_VANCOUVER-WHITTIER	52.0	26.4		35.9		10.9	3.5%
PCL Island	P-IP_20190529	7	7d_WHITTIER- VANCOUVER	69.4	26.7		52.6		12.2	0.2%
PCL Island	P-IP_20190605	7	7d_VANCOUVER-WHITTIER	49.5	24.7		38.2		11.8	0.3%
PCL Island	P-IP_20190612	7	7d_WHITTIER- VANCOUVER	70.7	25.7		52.8		12.4	0.2%
PCL Island	P-IP_20190619	7	7d_VANCOUVER-WHITTIER	49.0	25.4		37.8		10.9	0.0%
PCL Island	P-IP_20190626	7	7d_WHITTIER- VANCOUVER	69.0	25.2		54.7		12.5	0.0%
PCL Island	P-IP_20190703	7	7d_VANCOUVER-WHITTIER	49.3	25.9		37.5		11.4	0.3%
PCL Island	P-IP_20190710	7	7d_WHITTIER- VANCOUVER	70.9	24.7		53.5		12.7	0.0%
PCL Island	P-IP_20190717	7	7d_VANCOUVER-WHITTIER	50.2	24.1		38.1		11.3	0.6%
PCL Island	P-IP_20190724	7	7d_WHITTIER- VANCOUVER	70.2	25.3		53.5		12.9	0.0%
PCL Island	P-IP_20190731	7	7d_VANCOUVER-WHITTIER	50.4	25.7		38.0		11.0	0.2%
PCL Island	P-IP_20190807	7	7d_WHITTIER- VANCOUVER	69.9	25.9		53.1		12.8	0.1%
PCL Island	P-IP_20190814	7	7d_VANCOUVER-WHITTIER	50.1	24.8		38.9		13.6	0.2%
PCL Island	P-IP_20190821	7	7d_WHITTIER- VANCOUVER	60.8	23.5		52.3		12.4	7.7%
PCL Island	P-IP_20190828	7	7d_VANCOUVER-WHITTIER	51.5	25.8		37.3		11.0	0.0%
PCL Island	P-IP_20190904	7	7d_WHITTIER- VANCOUVER	71.3	24.6		53.6		12.2	0.0%
PCL Island	P-IP_20190911	5	7d_VANCOUVER-VANCOUVER	7.0	1.7		7.6			0.0%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC

IV.C.2.a. Analysis of the Ship hours for the Alaska itineraries

Golden Princess

				IV.C.2.a - Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
PCL Golden	P-NP_20190507	7	7d_VANCOUVER-VANCOUVER	43.9	16.6	5.7	34.5		14.0	0.0%
PCL Golden	P-NP_20190514	4	4d_VANCOUVER-VANCOUVER	6.0	3.0		9.6			0.1%
PCL Golden	P-NP_20190518	7	7d_VANCOUVER-WHITTIER	48.1	22.8		39.6		10.8	0.0%
PCL Golden	P-NP_20190525	7	7d_WHITTIER- VANCOUVER	64.7	26.1		56.6		12.3	1.5%
PCL Golden	P-NP_20190601	7	7d_VANCOUVER-WHITTIER	50.2	21.3		38.5		11.0	0.2%
PCL Golden	P-NP_20190608	7	7d_WHITTIER- VANCOUVER	67.5	25.6		56.3		12.2	0.0%
PCL Golden	P-NP_20190615	7	7d_VANCOUVER-WHITTIER	50.0	21.1		37.0		11.1	1.3%
PCL Golden	P-NP_20190622	7	7d_WHITTIER- VANCOUVER	68.4	25.2		55.3		12.2	0.1%
PCL Golden	P-NP_20190629	7	7d_VANCOUVER-WHITTIER	50.6	21.2		38.5		11.5	1.1%
PCL Golden	P-NP_20190706	7	7d_WHITTIER- VANCOUVER	68.2	24.6		56.3		12.1	0.1%
PCL Golden	P-NP_20190713	7	7d_VANCOUVER-WHITTIER	50.7	21.3		38.4		11.1	0.0%
PCL Golden	P-NP_20190720	7	7d_WHITTIER- VANCOUVER	64.7	25.8		57.0		12.3	1.2%
PCL Golden	P-NP_20190727	7	7d_VANCOUVER-WHITTIER	45.5	22.3		38.6		10.2	2.4%
PCL Golden	P-NP_20190803	7	7d_WHITTIER- VANCOUVER	68.7	25.9		54.4		11.9	0.0%
PCL Golden	P-NP_20190810	7	7d_VANCOUVER-WHITTIER	48.4	23.1		38.8		10.7	0.1%
PCL Golden	P-NP_20190817	7	7d_WHITTIER- VANCOUVER	60.9	26.5		61.9		12.5	0.0%
PCL Golden	P-NP_20190824	7	7d_VANCOUVER-WHITTIER	50.0	21.5		38.8		10.5	0.0%
PCL Golden	P-NP_20190831	7	7d_WHITTIER- VANCOUVER	67.8	24.3		57.0		12.3	0.0%
PCL Golden	P-NP_20190907	7	7d_VANCOUVER-WHITTIER	50.2	21.9		38.2		10.7	0.0%
PCL Golden	P-NP_20190914	7	7d_WHITTIER- VANCOUVER	67.9	25.8		55.3		11.7	0.0%
PCL Golden	P-NP_20190921	4	4d_VANCOUVER-VANCOUVER	6.9	2.9		9.5			0.0%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC

IV.C.2.a. Analysis of the Ship hours for the Alaska itineraries

Royal Princess

				IV.C.2.a. Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
PCL Royal	P-RP_20190511	7	7d_VANCOUVER-WHITTIER	21.4	20.9	7.8	28.7	3.0	0.7	24.8%
PCL Royal	P-RP_20190518	7	7d_WHITTIER- VANCOUVER	66.8	26.7		55.8		12.7	0.0%
PCL Royal	P-RP_20190525	7	7d_VANCOUVER-WHITTIER	50.5	22.4	5.6	38.5		11.5	0.0%
PCL Royal	P-RP_20190601	7	7d_WHITTIER- VANCOUVER	63.5	26.1		54.4		12.1	7.8%
PCL Royal	P-RP_20190608	7	7d_VANCOUVER-WHITTIER	49.4	23.2	5.6	38.6		11.5	0.0%
PCL Royal	P-RP_20190615	7	7d_WHITTIER- VANCOUVER	66.9	25.5		56.0		12.5	0.0%
PCL Royal	P-RP_20190622	7	7d_VANCOUVER-WHITTIER	50.8	20.7	6.0	38.5		12.3	0.0%
PCL Royal	P-RP_20190629	7	7d_WHITTIER- VANCOUVER	17.8	27.0		20.9		1.9	51.0%
PCL Royal	P-RP_20190706	7	7d_VANCOUVER-WHITTIER	50.9	20.9	6.8	38.2		12.0	0.0%
PCL Royal	P-RP_20190713	7	7d_WHITTIER- VANCOUVER	67.2	26.2		55.1		11.7	0.0%
PCL Royal	P-RP_20190720	7	7d_VANCOUVER-WHITTIER	50.2	21.3	6.1	38.6		12.0	0.0%
PCL Royal	P-RP_20190727	7	7d_WHITTIER- VANCOUVER	64.1	28.2		54.6		12.0	0.0%
PCL Royal	P-RP_20190803	7	7d_VANCOUVER-WHITTIER	51.4	19.8	7.1	38.7		11.6	0.0%
PCL Royal	P-RP_20190810	7	7d_WHITTIER- VANCOUVER	65.1	26.9		54.6		11.9	0.0%
PCL Royal	P-RP_20190817	7	7d_VANCOUVER-WHITTIER	59.6	25.9	6.5	25.0		14.4	0.0%
PCL Royal	P-RP_20190824	7	7d_WHITTIER- VANCOUVER	64.4	27.1		54.4		12.6	0.0%
PCL Royal	P-RP_20190831	7	7d_VANCOUVER-WHITTIER	51.0	19.8	6.4	34.1		11.8	0.0%
PCL Royal	P-RP_20190907	7	7d_WHITTIER- VANCOUVER	65.2	26.8		54.4		12.0	0.0%
PCL Royal	P-RP_20190914	3	3d_VANCOUVER-LOS ANGELES			6.3			2.7	0.0%
PCL Royal	P-RP_20190917	12	12d_LOS ANGELES-LOS ANGELES	54.4	10.0	4.6	35.0	9.1	12.7	0.0%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC.

IV.C.2.a. Analysis of the Ship hours for the Alaska itineraries

Ruby Princess

				IV.C.2.a - Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
PCL Ruby	P-RU_20190423	12	12d_LOS ANGELES-LOS ANGELES	49.2	16.6	5.0	37.1	10.2	14.5	0.0%
PCL Ruby	P-RU_20190511	7	7d_SEATTLE-SEATTLE	46.8	10.1	13.9	31.6	10.1	10.2	0.2%
PCL Ruby	P-RU_20190518	7	7d_SEATTLE-SEATTLE	48.1	10.1	12.0	31.9	10.1	10.4	0.0%
PCL Ruby	P-RU_20190525	7	7d_SEATTLE-SEATTLE	48.3	9.9	11.3	32.1	9.9	10.0	0.0%
PCL Ruby	P-RU_20190608	7	7d_SEATTLE-SEATTLE	47.9	9.8	11.7	32.2	10.0	9.9	0.0%
PCL Ruby	P-RU_20190615	7	7d_SEATTLE-SEATTLE	47.9	9.8	12.1	32.5	10.1	10.5	0.0%
PCL Ruby	P-RU_20190622	7	7d_SEATTLE-SEATTLE	48.4	9.6	11.0	31.7	10.0	10.4	0.1%
PCL Ruby	P-RU_20190629	7	7d_SEATTLE-SEATTLE	48.4	10.0	11.4	31.9	10.1	10.5	0.1%
PCL Ruby	P-RU_20190706	7	7d_SEATTLE-SEATTLE	48.5	9.8	11.5	31.9	10.0	10.3	0.0%
PCL Ruby	P-RU_20190713	7	7d_SEATTLE-SEATTLE	48.0	10.3	11.2	32.3	9.6	10.5	0.3%
PCL Ruby	P-RU_20190720	7	7d_SEATTLE-SEATTLE	48.1	10.3	11.6	31.5	10.4	10.5	0.0%
PCL Ruby	P-RU_20190727	7	7d_SEATTLE-SEATTLE	48.2	9.9	11.8	31.9	10.0	10.3	0.0%
PCL Ruby	P-RU_20190803	7	7d_SEATTLE-SEATTLE	48.3	9.7	11.6	31.9	10.1	10.8	0.0%
PCL Ruby	P-RU_20190810	7	7d_SEATTLE-SEATTLE	47.6	10.9	11.8	31.8	10.1	10.7	0.0%
PCL Ruby	P-RU_20190817	7	7d_SEATTLE-SEATTLE	48.8	10.7	10.4	30.4	8.9	11.0	1.0%
PCL Ruby	P-RU_20190824	7	7d_SEATTLE-SEATTLE	48.1	10.4	12.9	31.9	10.0	10.6	1.1%
PCL Ruby	P-RU_20190831	7	7d_SEATTLE-SEATTLE	48.7	10.2	11.8	31.4	9.6	10.8	0.3%
PCL Ruby	P-RU_20190907	7	7d_SEATTLE-SEATTLE	49.2	10.4	11.1	31.2	10.0	10.5	0.1%
PCL Ruby	P-RU_20190914	7	7d_SEATTLE-VANCOUVER	48.7	9.4	11.6	32.0	10.1	10.0	0.0%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC

IV.C.2.a. Analysis of the Ship Hours for the Alaska Itineraries

Star Princess

				IV.C.2.a. Ship Hours						
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) VGP-ALASKA Transit	(2) ECA_ALASKA Transit (no VGP)	(3) VGP-noALASKA Transit	(4) ALASKA Port (VGP)	(5) US Port (noALASKA, VGP)	(6) MARSAN noCANADA noPort	Not available data% (for IV.C.2.a)
PCL Star	P-TP_20190427	12	12d_LOS ANGELES-LOS ANGELES	50.9	9.8	5.3	36.4	12.2	11.3	0.1%
PCL Star	P-TP_20190512	7	7d_VANCOUVER-SEATTLE	39.7	9.4	7.2	30.3		3.7	0.0%
PCL Star	P-TP_20190519	7	7d_SEATTLE-SEATTLE	40.7	8.6	12.9	29.6	10.6	1.0	0.0%
PCL Star	P-TP_20190526	7	7d_SEATTLE-SEATTLE	40.4	9.1	12.6	29.9	10.8	1.2	0.1%
PCL Star	P-TP_20190602	7	7d_SEATTLE-SEATTLE	40.7	8.8	12.4	29.3	10.6	1.0	0.1%
PCL Star	P-TP_20190609	7	7d_SEATTLE-SEATTLE	39.7	9.2	12.8	29.1	10.4	1.0	0.0%
PCL Star	P-TP_20190616	7	7d_SEATTLE-SEATTLE	39.9	9.7	12.1	28.7	10.7	1.0	0.0%
PCL Star	P-TP_20190623	7	7d_SEATTLE-SEATTLE	40.0	9.3	13.6	29.6	12.5	0.9	0.1%
PCL Star	P-TP_20190630	7	7d_SEATTLE-SEATTLE	37.4	10.0	11.3	27.5	22.1	1.0	0.1%
PCL Star	P-TP_20190707	7	7d_SEATTLE-SEATTLE	41.1	9.1	12.5	29.5	11.3	0.8	0.0%
PCL Star	P-TP_20190714	7	7d_SEATTLE-SEATTLE	38.8	10.3	12.2	27.4	10.7	0.9	1.7%
PCL Star	P-TP_20190721	7	7d_SEATTLE-SEATTLE	38.8	11.1	13.0	29.4	11.4	0.9	0.1%
PCL Star	P-TP_20190728	7	7d_SEATTLE-SEATTLE	38.5	10.1	11.9	30.7	11.8	0.9	0.1%
PCL Star	P-TP_20190804	7	7d_SEATTLE-SEATTLE	39.8	9.6	7.8	29.6	4.8	1.0	8.3%
PCL Star	P-TP_20190811	7	7d_SEATTLE-SEATTLE	38.6	9.5	12.5	28.0	7.3	1.4	1.5%
PCL Star	P-TP_20190818	7	7d_SEATTLE-SEATTLE	38.6	11.3	11.6	26.4	15.6	1.0	1.8%
PCL Star	P-TP_20190825	7	7d_SEATTLE-SEATTLE	40.0	9.0	12.0	29.5	10.4	0.9	0.1%
PCL Star	P-TP_20190901	7	7d_SEATTLE-SEATTLE	37.2	9.6	13.5	31.3	10.4	1.3	0.1%
PCL Star	P-TP_20190908	7	7d_SEATTLE-SEATTLE	40.2	8.9	13.3	28.8	10.4	1.3	0.5%
PCL Star	P-TP_20190915	7	7d_SEATTLE-SEATTLE	40.4	9.5	17.9	29.3		1.1	3.5%

"MARSAN" = Marine Sanctuaries in U.S. waters

CARNIVAL CORPORATION&PLC

C. Annual Reporting

2. Characterization of Voyages of the Covered Cruise Ships that operated in Alaska during the 2019 sailing season (through September 30).

This report includes:

b. Characterization of time during the voyage where engines were powered by (l) low sulfur fuel oil or (2) high sulfur fuel oil combined with EGCSs and an explanation of the decision-making criteria for selection of the fuel source used, including how the different locations identified in IV.C.2.a. of the 2019 AOC are considered in this process.

Note:
Related to item IV.C.2.b.2: all Carnival group ships in Alaska were under instructions to operate EGCS to the fullest extent practical during manuevering and transits between ports, as beginning in May the company initiated a policy to use marine gasoil in Alaska ports to help avoid public concerns and potential ADEC violations for visible smoke (e.g. "white plume").
The other major cruise companies complied as well.
Therefore any engine (DG) hours using MGO would be due to: in port; lack of sufficient EGCS-equipped engines to conduct that leg of the itinerary; non-availability of one or more EGCS; or compliance challenges leading to change of fuel or engine.

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

HAL Amsterdam, HAL Maasdam

				IV.C.2.b. DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
HAL Amsterdam	H-AM_20190603	14	14d_SEATTLE - SEATTLE	203.3	Insufficient EGCS available and/or Alaska port operations	412.1	1.4%
HAL Amsterdam	H-AM_20190617	14	14d_SEATTLE - SEATTLE	188.4	Insufficient EGCS available and/or Alaska port operations	392.1	0.8%
HAL Amsterdam	H-AM_20190701	7	7d_SEATTLE - SEATTLE	93.3	Insufficient EGCS available and/or Alaska port operations	263.7	0.4%
HAL Amsterdam	H-AM_20190708	7	7d_SEATTLE - SEATTLE	93.2	Insufficient EGCS available and/or Alaska port operations	258.5	0.7%
HAL Amsterdam	H-AM_20190715	14	14d_SEATTLE - SEATTLE	180.1	Insufficient EGCS available and/or Alaska port operations	404.5	0.3%
HAL Amsterdam	H-AM_20190729	14	14d_SEATTLE - SEATTLE	158.6	Insufficient EGCS available and/or Alaska port operations	417.4	0.4%
HAL Amsterdam	H-AM_20190812	14	14d_SEATTLE - SEATTLE	156.1	Insufficient EGCS available and/or Alaska port operations	442.7	0.7%
HAL Amsterdam	H-AM_20190826	14	14d_SEATTLE - SEATTLE	165.1	Insufficient EGCS available and/or Alaska port operations	399.9	0.1%
HAL Amsterdam	H-AM_20190909	14	14d_SEATTLE - SEATTLE	168.9	Insufficient EGCS available and/or Alaska port operations	429.7	1.1%
HAL Maasdam	H-MS_20190507	21	21d_SAN FRANCISCO-SAN FRANCISCO	429.5	Insufficient EGCS available and/or Alaska port operations	829.3	3.8%
HAL Maasdam	H-MS_20190528	21	21d_SAN FRANCISCO-SAN FRANCISCO	379.5	Insufficient EGCS available and/or Alaska port operations	817.7	3.0%
HAL Maasdam	H-MS_20190618	21	21d_SAN FRANCISCO-SAN FRANCISCO	470.6	Insufficient EGCS available and/or Alaska port operations	821.0	3.7%
HAL Maasdam	H-MS_20190709	22	22d_SAN FRANCISCO-YOKOHAMA	403.0	Insufficient EGCS available and/or Alaska port operations	342.5	3.1%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

HAL Eurodam

IV.C.2.b. - DG Hours U.S. ECA or VGP (Alaska included)

Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
HAL Eurodam	H-EU_20190504	7	7d_SEATTLE - SEATTLE	254.8	Insufficient EGCS available and/or Alaska port operations	204.4	0.1%
HAL Eurodam	H-EU_20190511	7	7d_SEATTLE - SEATTLE	188.0	Insufficient EGCS available and/or Alaska port operations	264.2	0.7%
HAL Eurodam	H-EU_20190518	7	7d_SEATTLE - SEATTLE	175.8	Insufficient EGCS available and/or Alaska port operations	272.0	0.1%
HAL Eurodam	H-EU_20190525	7	7d_SEATTLE - SEATTLE	165.6	Insufficient EGCS available and/or Alaska port operations	280.0	0.1%
HAL Eurodam	H-EU_20190601	7	7d_SEATTLE - SEATTLE	190.8	Insufficient EGCS available and/or Alaska port operations	260.7	0.1%
HAL Eurodam	H-EU_20190608	7	7d_SEATTLE - SEATTLE	198.8	Insufficient EGCS available and/or Alaska port operations	254.1	0.1%
HAL Eurodam	H-EU_20190615	7	7d_SEATTLE - SEATTLE	192.4	Insufficient EGCS available and/or Alaska port operations	268.3	0.0%
HAL Eurodam	H-EU_20190622	7	7d_SEATTLE - SEATTLE	270.5	Insufficient EGCS available and/or Alaska port operations	230.6	0.0%
HAL Eurodam	H-EU_20190629	7	7d_SEATTLE - SEATTLE	122.3	Insufficient EGCS available and/or Alaska port operations	90.8	63.7%
HAL Eurodam	H-EU_20190706	7	7d_SEATTLE - SEATTLE				100.0%
HAL Eurodam	H-EU_20190713	7	7d_SEATTLE - SEATTLE	159.5	Insufficient EGCS available and/or Alaska port operations	88.0	48.0%
HAL Eurodam	H-EU_20190720	7	7d_SEATTLE - SEATTLE	211.0	Insufficient EGCS available and/or Alaska port operations	248.8	0.1%
HAL Eurodam	H-EU_20190727	7	7d_SEATTLE - SEATTLE	214.4	Insufficient EGCS available and/or Alaska port operations	260.7	0.1%
HAL Eurodam	H-EU_20190803	7	7d_SEATTLE - SEATTLE	259.8	Insufficient EGCS available and/or Alaska port operations	207.5	0.0%
HAL Eurodam	H-EU_20190810	7	7d_SEATTLE - SEATTLE	276.7	Insufficient EGCS available and/or Alaska port operations	226.0	0.0%
HAL Eurodam	H-EU_20190817	7	7d_SEATTLE - SEATTLE	268.3	Insufficient EGCS available and/or Alaska port operations	197.6	0.0%
HAL Eurodam	H-EU_20190824	7	7d_SEATTLE - SEATTLE	217.5	Insufficient EGCS available and/or Alaska port operations	262.1	0.0%
HAL Eurodam	H-EU_20190831	7	7d_SEATTLE - SEATTLE	232.3	Insufficient EGCS available and/or Alaska port operations	249.6	0.2%
HAL Eurodam	H-EU_20190907	7	7d_SEATTLE - SEATTLE	202.4	Insufficient EGCS available and/or Alaska port operations	269.7	0.3%
HAL Eurodam	H-EU_20190914	7	7d_SEATTLE - SEATTLE	247.5	Insufficient EGCS available and/or Alaska port operations	229.9	0.4%
HAL Eurodam	H-EU_20190921	7	7d_SEATTLE - SEATTLE	247.3	Insufficient EGCS available and/or Alaska port operations	231.6	0.5%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

HAL Nieuw Amsterdam

				IV.C.2.b - DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
HAL N.Amsterdam	H-NA_20190504	7	7d_VANCOUVER - VANCOUVER	137.8	Insufficient EGCS available and/or Alaska port operations	254.8	0.7%
HAL N.Amsterdam	H-NA_20190511	7	7d_VANCOUVER - VANCOUVER	121.2	Insufficient EGCS available and/or Alaska port operations	219.0	14.3%
HAL N.Amsterdam	H-NA_20190518	7	7d_VANCOUVER - VANCOUVER	124.7	Insufficient EGCS available and/or Alaska port operations	270.7	0.8%
HAL N.Amsterdam	H-NA_20190525	7	7d_VANCOUVER - VANCOUVER	116.1	Insufficient EGCS available and/or Alaska port operations	254.0	0.5%
HAL N.Amsterdam	H-NA_20190601	7	7d_VANCOUVER - VANCOUVER	115.1	Insufficient EGCS available and/or Alaska port operations	260.9	0.5%
HAL N.Amsterdam	H-NA_20190608	7	7d_VANCOUVER - VANCOUVER	109.1	Insufficient EGCS available and/or Alaska port operations	272.6	0.6%
HAL N.Amsterdam	H-NA_20190615	7	7d_VANCOUVER - VANCOUVER	114.3	Insufficient EGCS available and/or Alaska port operations	257.7	0.8%
HAL N.Amsterdam	H-NA_20190622	7	7d_VANCOUVER - VANCOUVER	110.1	Insufficient EGCS available and/or Alaska port operations	234.9	3.9%
HAL N.Amsterdam	H-NA_20190629	7	7d_VANCOUVER - VANCOUVER	104.9	Insufficient EGCS available and/or Alaska port operations	222.4	11.1%
HAL N.Amsterdam	H-NA_20190706	7	7d_VANCOUVER - VANCOUVER	11.1	Insufficient EGCS available and/or Alaska port operations	65.4	66.8%
HAL N.Amsterdam	H-NA_20190713	7	7d_VANCOUVER - VANCOUVER	116.0	Insufficient EGCS available and/or Alaska port operations	241.0	5.3%
HAL N.Amsterdam	H-NA_20190720	7	7d_VANCOUVER - VANCOUVER	147.1	Insufficient EGCS available and/or Alaska port operations	231.5	4.7%
HAL N.Amsterdam	H-NA_20190727	7	7d_VANCOUVER - VANCOUVER	123.5	Insufficient EGCS available and/or Alaska port operations	248.6	9.3%
HAL N.Amsterdam	H-NA_20190803	7	7d_VANCOUVER - VANCOUVER	101.8	Insufficient EGCS available and/or Alaska port operations	278.0	5.1%
HAL N.Amsterdam	H-NA_20190810	7	7d_VANCOUVER - VANCOUVER	155.7	Insufficient EGCS available and/or Alaska port operations	195.3	14.6%
HAL N.Amsterdam	H-NA_20190817	7	7d_VANCOUVER - VANCOUVER	176.6	Insufficient EGCS available and/or Alaska port operations	227.1	4.2%
HAL N.Amsterdam	H-NA_20190824	7	7d_VANCOUVER - VANCOUVER	162.8	Insufficient EGCS available and/or Alaska port operations	213.5	4.7%
HAL N.Amsterdam	H-NA_20190831	7	7d_VANCOUVER - VANCOUVER	74.4	Insufficient EGCS available and/or Alaska port operations	268.2	13.9%
HAL N.Amsterdam	H-NA_20190907	7	7d_VANCOUVER - VANCOUVER	102.9	Insufficient EGCS available and/or Alaska port operations	252.4	11.5%
HAL N.Amsterdam	H-NA_20190914	7	7d_VANCOUVER - VANCOUVER	111.9	Insufficient EGCS available and/or Alaska port operations	263.6	6.3%
HAL N.Amsterdam	H-NA_20190921	7	7d_VANCOUVER - VANCOUVER	122.9	Insufficient EGCS available and/or Alaska port operations	292.6	2.9%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

HAL Noordam

				IV.C.2.b - DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
HAL Noordam	H-NO_20190512	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	123.1	Insufficient EGCS available and/or Alaska port operations	219.0	0.7%
HAL Noordam	H-NO_20190519	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	147.3	Insufficient EGCS available and/or Alaska port operations	190.7	0.2%
HAL Noordam	H-NO_20190526	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	120.4	Insufficient EGCS available and/or Alaska port operations	214.1	0.3%
HAL Noordam	H-NO_20190602	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	146.5	Insufficient EGCS available and/or Alaska port operations	188.6	0.2%
HAL Noordam	H-NO_20190609	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	153.5	Insufficient EGCS available and/or Alaska port operations	170.5	2.4%
HAL Noordam	H-NO_20190616	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	155.1	Insufficient EGCS available and/or Alaska port operations	183.4	0.4%
HAL Noordam	H-NO_20190623	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	120.6	Insufficient EGCS available and/or Alaska port operations	211.5	0.7%
HAL Noordam	H-NO_20190630	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	151.1	Insufficient EGCS available and/or Alaska port operations	196.5	0.6%
HAL Noordam	H-NO_20190707	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	173.5	Insufficient EGCS available and/or Alaska port operations	160.8	0.8%
HAL Noordam	H-NO_20190714	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	231.6	Insufficient EGCS available and/or Alaska port operations	118.0	0.1%
HAL Noordam	H-NO_20190721	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	131.5	Insufficient EGCS available and/or Alaska port operations	202.4	0.3%
HAL Noordam	H-NO_20190728	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	163.4	Insufficient EGCS available and/or Alaska port operations	188.5	0.3%
HAL Noordam	H-NO_20190804	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	114.2	Insufficient EGCS available and/or Alaska port operations	191.2	4.6%
HAL Noordam	H-NO_20190811	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	171.3	Insufficient EGCS available and/or Alaska port operations	174.0	0.6%
HAL Noordam	H-NO_20190818	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	129.6	Insufficient EGCS available and/or Alaska port operations	193.0	0.3%
HAL Noordam	H-NO_20190825	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	167.8	Insufficient EGCS available and/or Alaska port operations	183.1	0.2%
HAL Noordam	H-NO_20190901	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	144.1	Insufficient EGCS available and/or Alaska port operations	191.1	0.4%
HAL Noordam	H-NO_20190908	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	137.8	Insufficient EGCS available and/or Alaska port operations	199.9	1.4%
HAL Noordam	H-NO_20190915	7	7d_VANCOUVER - VANCOUVER	155.4	Insufficient EGCS available and/or Alaska port operations	257.2	0.1%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

HAL Oosterdam

				IV.C.2.b. DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
HAL Oosterdam	H-OO_20190505	7	7d_SEATTLE - SEATTLE	84.6	Insufficient EGCS available and/or Alaska port operations	382.3	0.4%
HAL Oosterdam	H-OO_20190512	7	7d_SEATTLE - SEATTLE	68.0	Insufficient EGCS available and/or Alaska port operations	369.8	1.3%
HAL Oosterdam	H-OO_20190519	7	7d_SEATTLE - SEATTLE	66.7	Insufficient EGCS available and/or Alaska port operations	382.0	0.4%
HAL Oosterdam	H-OO_20190526	7	7d_SEATTLE - SEATTLE	68.7	Insufficient EGCS available and/or Alaska port operations	368.5	0.3%
HAL Oosterdam	H-OO_20190602	7	7d_SEATTLE - SEATTLE	67.0	Insufficient EGCS available and/or Alaska port operations	390.5	0.3%
HAL Oosterdam	H-OO_20190609	7	7d_SEATTLE - SEATTLE	123.8	Insufficient EGCS available and/or Alaska port operations	322.1	1.5%
HAL Oosterdam	H-OO_20190616	7	7d_SEATTLE - SEATTLE	86.6	Insufficient EGCS available and/or Alaska port operations	367.6	0.9%
HAL Oosterdam	H-OO_20190623	7	7d_SEATTLE - SEATTLE	93.6	Insufficient EGCS available and/or Alaska port operations	357.9	0.5%
HAL Oosterdam	H-OO_20190630	7	7d_SEATTLE - SEATTLE	79.0	Insufficient EGCS available and/or Alaska port operations	342.8	0.4%
HAL Oosterdam	H-OO_20190707	7	7d_SEATTLE - SEATTLE	73.6	Insufficient EGCS available and/or Alaska port operations	359.7	0.8%
HAL Oosterdam	H-OO_20190714	7	7d_SEATTLE - SEATTLE	85.7	Insufficient EGCS available and/or Alaska port operations	344.3	0.4%
HAL Oosterdam	H-OO_20190721	7	7d_SEATTLE - SEATTLE	117.9	Insufficient EGCS available and/or Alaska port operations	326.5	0.6%
HAL Oosterdam	H-OO_20190728	7	7d_SEATTLE - SEATTLE	104.1	Insufficient EGCS available and/or Alaska port operations	343.0	0.6%
HAL Oosterdam	H-OO_20190804	7	7d_SEATTLE - SEATTLE	141.8	Insufficient EGCS available and/or Alaska port operations	308.6	0.3%
HAL Oosterdam	H-OO_20190811	7	7d_SEATTLE - SEATTLE	119.6	Insufficient EGCS available and/or Alaska port operations	317.4	0.5%
HAL Oosterdam	H-OO_20190818	7	7d_SEATTLE - SEATTLE	97.1	Insufficient EGCS available and/or Alaska port operations	377.0	0.4%
HAL Oosterdam	H-OO_20190825	7	7d_SEATTLE - SEATTLE	115.6	Insufficient EGCS available and/or Alaska port operations	326.4	0.4%
HAL Oosterdam	H-OO_20190901	7	7d_SEATTLE - SEATTLE	102.3	Insufficient EGCS available and/or Alaska port operations	341.3	0.3%
HAL Oosterdam	H-OO_20190908	7	7d_SEATTLE - SEATTLE	92.8	Insufficient EGCS available and/or Alaska port operations	377.3	0.5%
HAL Oosterdam	H-OO_20190915	7	7d_SEATTLE - SEATTLE	86.3	Insufficient EGCS available and/or Alaska port operations	370.7	0.3%
HAL Oosterdam	H-OO_20190922	7	7d_SEATTLE - SEATTLE	89.9	Insufficient EGCS available and/or Alaska port operations	353.8	0.3%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

HAL Volendam

				IV.C.2.b - DG Hours (U.S. ECA or VGP / Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
HAL Volendam	H-VO_20190508	7	7d_VANCOUVER - VANCOUVER	243.4	insufficient EGCS available and/or Alaska port operations	155.3	0.6%
HAL Volendam	H-VO_20190515	7	7d_VANCOUVER - VANCOUVER	191.4	insufficient EGCS available and/or Alaska port operations	208.1	0.2%
HAL Volendam	H-VO_20190522	7	7d_VANCOUVER - VANCOUVER	107.4	insufficient EGCS available and/or Alaska port operations	223.9	19.0%
HAL Volendam	H-VO_20190529	7	7d_VANCOUVER - VANCOUVER	218.1	insufficient EGCS available and/or Alaska port operations	186.6	0.3%
HAL Volendam	H-VO_20190605	7	7d_VANCOUVER - VANCOUVER	254.3	insufficient EGCS available and/or Alaska port operations	166.1	0.1%
HAL Volendam	H-VO_20190612	7	7d_VANCOUVER - VANCOUVER	215.4	insufficient EGCS available and/or Alaska port operations	174.6	2.5%
HAL Volendam	H-VO_20190619	7	7d_VANCOUVER - VANCOUVER	262.4	insufficient EGCS available and/or Alaska port operations	158.6	0.9%
HAL Volendam	H-VO_20190626	7	7d_VANCOUVER - VANCOUVER	208.2	insufficient EGCS available and/or Alaska port operations	205.5	0.4%
HAL Volendam	H-VO_20190703	7	7d_VANCOUVER - VANCOUVER	150.9	insufficient EGCS available and/or Alaska port operations	251.6	0.3%
HAL Volendam	H-VO_20190710	7	7d_VANCOUVER - VANCOUVER	147.1	insufficient EGCS available and/or Alaska port operations	257.3	0.9%
HAL Volendam	H-VO_20190717	7	7d_VANCOUVER - VANCOUVER	149.7	insufficient EGCS available and/or Alaska port operations	255.3	0.2%
HAL Volendam	H-VO_20190724	7	7d_VANCOUVER - VANCOUVER	133.9	insufficient EGCS available and/or Alaska port operations	258.9	0.3%
HAL Volendam	H-VO_20190731	7	7d_VANCOUVER - VANCOUVER	154.0	insufficient EGCS available and/or Alaska port operations	246.7	0.3%
HAL Volendam	H-VO_20190807	7	7d_VANCOUVER - VANCOUVER	152.3	insufficient EGCS available and/or Alaska port operations	235.2	0.3%
HAL Volendam	H-VO_20190814	7	7d_VANCOUVER - VANCOUVER	212.9	insufficient EGCS available and/or Alaska port operations	203.0	0.8%
HAL Volendam	H-VO_20190821	7	7d_VANCOUVER - VANCOUVER	142.4	insufficient EGCS available and/or Alaska port operations	249.4	0.3%
HAL Volendam	H-VO_20190828	7	7d_VANCOUVER - VANCOUVER	115.6	insufficient EGCS available and/or Alaska port operations	255.8	4.9%
HAL Volendam	H-VO_20190904	7	7d_VANCOUVER - VANCOUVER	130.3	insufficient EGCS available and/or Alaska port operations	257.4	0.3%
HAL Volendam	H-VO_20190911	7	7d_VANCOUVER - VANCOUVER	143.5	insufficient EGCS available and/or Alaska port operations	269.5	0.7%
HAL Volendam	H-VO_20190918	7	7d_VANCOUVER - VANCOUVER	165.1	insufficient EGCS available and/or Alaska port operations	262.7	0.3%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

HAL Westerdam

				IV.C.2.b. DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
HAL Westerdam	H-WE_20190428	14	15d_YOKOHAMA (TOKYO) - VANCOUVER	29.5	Insufficient EGCS available and/or Alaska port operations	158.0	0.0%
HAL Westerdam	H-WE_20190512	7	7d_VANCOUVER - VANCOUVER	110.8	Insufficient EGCS available and/or Alaska port operations	276.1	1.0%
HAL Westerdam	H-WE_20190519	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	107.4	Insufficient EGCS available and/or Alaska port operations	189.2	0.7%
HAL Westerdam	H-WE_20190526	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	118.5	Insufficient EGCS available and/or Alaska port operations	148.7	22.0%
HAL Westerdam	H-WE_20190602	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	96.4	Insufficient EGCS available and/or Alaska port operations	135.6	44.0%
HAL Westerdam	H-WE_20190609	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	121.5	Insufficient EGCS available and/or Alaska port operations	184.2	1.9%
HAL Westerdam	H-WE_20190616	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	118.9	Insufficient EGCS available and/or Alaska port operations	184.4	0.5%
HAL Westerdam	H-WE_20190623	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	129.5	Insufficient EGCS available and/or Alaska port operations	189.3	0.3%
HAL Westerdam	H-WE_20190630	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	116.6	Insufficient EGCS available and/or Alaska port operations	191.1	0.3%
HAL Westerdam	H-WE_20190707	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	130.2	Insufficient EGCS available and/or Alaska port operations	184.4	0.7%
HAL Westerdam	H-WE_20190714	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	118.6	Insufficient EGCS available and/or Alaska port operations	186.2	0.2%
HAL Westerdam	H-WE_20190721	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	126.4	Insufficient EGCS available and/or Alaska port operations	194.5	0.2%
HAL Westerdam	H-WE_20190728	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	113.5	Insufficient EGCS available and/or Alaska port operations	187.4	0.1%
HAL Westerdam	H-WE_20190804	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	134.4	Insufficient EGCS available and/or Alaska port operations	194.5	0.3%
HAL Westerdam	H-WE_20190811	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	106.0	Insufficient EGCS available and/or Alaska port operations	201.1	0.4%
HAL Westerdam	H-WE_20190818	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	126.9	Insufficient EGCS available and/or Alaska port operations	191.6	0.4%
HAL Westerdam	H-WE_20190825	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	108.4	Insufficient EGCS available and/or Alaska port operations	191.6	0.3%
HAL Westerdam	H-WE_20190901	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	126.9	Insufficient EGCS available and/or Alaska port operations	182.5	0.3%
HAL Westerdam	H-WE_20190908	7	7d_VANCOUVER - SEWARD (ANCHORAGE)	103.5	Insufficient EGCS available and/or Alaska port operations	201.9	0.5%
HAL Westerdam	H-WE_20190915	7	7d_SEWARD (ANCHORAGE) - VANCOUVER	122.7	Insufficient EGCS available and/or Alaska port operations	213.1	0.3%
HAL Westerdam	H-WE_20190922	7	7d_VANCOUVER - VANCOUVER	106.7	Insufficient EGCS available and/or Alaska port operations	262.0	0.4%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

Carnival Legend, Cunard Queen Elizabeth

				IV.C.2.b - DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
CCL Legend	K-LE_20190429	7	7d_VANCOUVER-SEATTLE	470.9	Insufficient EGCS available and/or Alaska port operations		0.6%
CCL Legend	K-LE_20190506	8	7d_SEATTLE-SEATTLE	355.1	Insufficient EGCS available and/or Alaska port operations	171.5	0.3%
CCL Legend	K-LE_20190514	7	7d_SEATTLE-SEATTLE	162.0	Insufficient EGCS available and/or Alaska port operations	307.3	18.9%
CCL Legend	K-LE_20190521	7	7d_SEATTLE-SEATTLE	197.5	Insufficient EGCS available and/or Alaska port operations	314.9	0.1%
CCL Legend	K-LE_20190528	7	7d_SEATTLE-SEATTLE	129.4	Insufficient EGCS available and/or Alaska port operations	340.4	0.6%
CCL Legend	K-LE_20190604	7	7d_SEATTLE-SEATTLE	177.4	Insufficient EGCS available and/or Alaska port operations	302.1	0.3%
CCL Legend	K-LE_20190611	7	7d_SEATTLE-SEATTLE	149.1	Insufficient EGCS available and/or Alaska port operations	342.2	0.2%
CCL Legend	K-LE_20190618	7	7d_SEATTLE-SEATTLE	143.0	Insufficient EGCS available and/or Alaska port operations	346.9	0.3%
CCL Legend	K-LE_20190625	7	7d_SEATTLE-SEATTLE	134.3	Insufficient EGCS available and/or Alaska port operations	340.4	0.4%
CCL Legend	K-LE_20190702	7	7d_SEATTLE-SEATTLE	139.5	Insufficient EGCS available and/or Alaska port operations	335.2	0.2%
CCL Legend	K-LE_20190709	7	7d_SEATTLE-SEATTLE	144.4	Insufficient EGCS available and/or Alaska port operations	340.7	0.6%
CCL Legend	K-LE_20190716	7	7d_SEATTLE-SEATTLE	168.4	Insufficient EGCS available and/or Alaska port operations	328.0	0.6%
CCL Legend	K-LE_20190723	7	7d_SEATTLE-SEATTLE	196.0	Insufficient EGCS available and/or Alaska port operations	303.1	0.3%
CCL Legend	K-LE_20190730	7	7d_SEATTLE-SEATTLE	133.4	Insufficient EGCS available and/or Alaska port operations	338.4	0.3%
CCL Legend	K-LE_20190806	7	7d_SEATTLE-SEATTLE	138.2	Insufficient EGCS available and/or Alaska port operations	336.8	0.3%
CCL Legend	K-LE_20190813	7	7d_SEATTLE-SEATTLE	142.2	Insufficient EGCS available and/or Alaska port operations	336.7	0.3%
CCL Legend	K-LE_20190820	7	7d_SEATTLE-SEATTLE	172.8	Insufficient EGCS available and/or Alaska port operations	340.3	0.2%
CCL Legend	K-LE_20190827	7	7d_SEATTLE-SEATTLE	148.9	Insufficient EGCS available and/or Alaska port operations	329.5	0.3%
CCL Legend	K-LE_20190903	7	7d_SEATTLE-SEATTLE	197.3	Insufficient EGCS available and/or Alaska port operations	306.3	0.3%
CCL Legend	K-LE_20190910	7	7d_SEATTLE-VANCOUVER	143.9	Insufficient EGCS available and/or Alaska port operations	324.2	0.0%
CCL Legend	K-LE_20190917	9	9d_VANCOUVER-VANCOUVER	247.1	Insufficient EGCS available and/or Alaska port operations	341.1	0.3%
CUK Q. Elizabeth	N-QE_20190505	26	26d_YOKOHAMA-VANCOUVER	624.4	Insufficient EGCS available and/or Alaska port operations	262.0	0.0%
CUK Q. Elizabeth	N-QE_20190531	10	10d_VANCOUVER-VANCOUVER	355.9	Insufficient EGCS available and/or Alaska port operations	211.7	0.2%
CUK Q. Elizabeth	N-QE_20190610	10	10d_VANCOUVER-VANCOUVER	237.1	Insufficient EGCS available and/or Alaska port operations	321.2	0.0%
CUK Q. Elizabeth	N-QE_20190620	10	10d_VANCOUVER-VANCOUVER	264.9	Insufficient EGCS available and/or Alaska port operations	320.2	0.1%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska itineraries

Grand Princess, Coral Princess

				IV.C.2.b. DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
PCL Grand	P-AP_20190506	10	10d_SAN FRANCISCO-SAN FRANCISCO	311.1	insufficient EGCS available and/or Alaska port operations	476.9	0.1%
PCL Grand	P-AP_20190516	10	10d_SAN FRANCISCO-SAN FRANCISCO	292.2	insufficient EGCS available and/or Alaska port operations	547.4	0.0%
PCL Grand	P-AP_20190526	10	10d_SAN FRANCISCO-SAN FRANCISCO	250.3	insufficient EGCS available and/or Alaska port operations	489.4	0.6%
PCL Grand	P-AP_20190605	10	10d_SAN FRANCISCO-SAN FRANCISCO	324.0	insufficient EGCS available and/or Alaska port operations	400.3	8.0%
PCL Grand	P-AP_20190615	10	10d_SAN FRANCISCO-SAN FRANCISCO	282.3	insufficient EGCS available and/or Alaska port operations	373.3	8.9%
PCL Grand	P-AP_20190625	10	10d_SAN FRANCISCO-SAN FRANCISCO	329.0	insufficient EGCS available and/or Alaska port operations	371.8	10.8%
PCL Grand	P-AP_20190705	10	10d_SAN FRANCISCO-SAN FRANCISCO	114.0	insufficient EGCS available and/or Alaska port operations	245.4	58.1%
PCL Grand	P-AP_20190715	10	10d_SAN FRANCISCO-SAN FRANCISCO	194.3	insufficient EGCS available and/or Alaska port operations	371.7	43.2%
PCL Grand	P-AP_20190725	10	10d_SAN FRANCISCO-SAN FRANCISCO	117.6	insufficient EGCS available and/or Alaska port operations	218.2	65.2%
PCL Grand	P-AP_20190804	10	10d_SAN FRANCISCO-SAN FRANCISCO	98.4	insufficient EGCS available and/or Alaska port operations	117.4	66.4%
PCL Grand	P-AP_20190814	10	10d_SAN FRANCISCO-SAN FRANCISCO	228.5	insufficient EGCS available and/or Alaska port operations	439.1	16.9%
PCL Grand	P-AP_20190824	10	10d_SAN FRANCISCO-SAN FRANCISCO	363.5	insufficient EGCS available and/or Alaska port operations	400.7	2.1%
PCL Grand	P-AP_20190903	10	10d_SAN FRANCISCO-SAN FRANCISCO	344.6	insufficient EGCS available and/or Alaska port operations	487.8	0.1%
PCL Grand	P-AP_20190913	10	10d_SAN FRANCISCO-SAN FRANCISCO	346.3	insufficient EGCS available and/or Alaska port operations	433.7	3.1%
PCL Coral	P-CO_20190508	7	7d_VANCOUVER-VANCOUVER	125.8	insufficient EGCS available and/or Alaska port operations	162.1	0.4%
PCL Coral	P-CO_20190515	7	7d_VANCOUVER-WHITTIER	140.2	insufficient EGCS available and/or Alaska port operations	143.0	6.7%
PCL Coral	P-CO_20190522	7	7d_WHITTIER- VANCOUVER	146.1	insufficient EGCS available and/or Alaska port operations	110.9	0.1%
PCL Coral	P-CO_20190529	7	7d_VANCOUVER-WHITTIER	94.8	insufficient EGCS available and/or Alaska port operations	131.7	0.0%
PCL Coral	P-CO_20190605	7	7d_WHITTIER- VANCOUVER	150.1	insufficient EGCS available and/or Alaska port operations	94.7	0.3%
PCL Coral	P-CO_20190612	7	7d_VANCOUVER-WHITTIER	98.0	insufficient EGCS available and/or Alaska port operations	155.9	0.6%
PCL Coral	P-CO_20190619	7	7d_WHITTIER- VANCOUVER	144.0	insufficient EGCS available and/or Alaska port operations	117.9	0.1%
PCL Coral	P-CO_20190626	7	7d_VANCOUVER-WHITTIER	103.1	insufficient EGCS available and/or Alaska port operations	154.1	0.1%
PCL Coral	P-CO_20190703	7	7d_WHITTIER- VANCOUVER	149.6	insufficient EGCS available and/or Alaska port operations	126.1	0.0%
PCL Coral	P-CO_20190710	7	7d_VANCOUVER-WHITTIER	106.7	insufficient EGCS available and/or Alaska port operations	159.8	0.0%
PCL Coral	P-CO_20190717	7	7d_WHITTIER- VANCOUVER	154.2	insufficient EGCS available and/or Alaska port operations	122.3	0.0%
PCL Coral	P-CO_20190724	7	7d_VANCOUVER-WHITTIER	103.3	insufficient EGCS available and/or Alaska port operations	171.4	0.0%
PCL Coral	P-CO_20190731	7	7d_WHITTIER- VANCOUVER	161.5	insufficient EGCS available and/or Alaska port operations	117.9	0.1%
PCL Coral	P-CO_20190807	7	7d_VANCOUVER-WHITTIER	105.2	insufficient EGCS available and/or Alaska port operations	165.6	0.1%
PCL Coral	P-CO_20190814	7	7d_WHITTIER- VANCOUVER	114.2	insufficient EGCS available and/or Alaska port operations	118.5	12.4%
PCL Coral	P-CO_20190821	7	7d_VANCOUVER-WHITTIER	100.4	insufficient EGCS available and/or Alaska port operations	129.3	0.0%
PCL Coral	P-CO_20190828	7	7d_WHITTIER- VANCOUVER	158.7	insufficient EGCS available and/or Alaska port operations	110.3	0.3%
PCL Coral	P-CO_20190904	7	7d_VANCOUVER-WHITTIER	112.1	insufficient EGCS available and/or Alaska port operations	151.0	0.0%
PCL Coral	P-CO_20190911	7	7d_WHITTIER- VANCOUVER	148.7	insufficient EGCS available and/or Alaska port operations	128.9	0.0%
PCL Coral	P-CO_20190918	7	7d_VANCOUVER-VANCOUVER	128.3	insufficient EGCS available and/or Alaska port operations	185.5	0.0%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

Island Princess

				IV.C.2.b. DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
PCL Island	P-IP_20190501	7	7d_VANCOUVER-VANCOUVER	37.9	Insufficient EGCS available and/or Alaska port operations	225.4	30.8%
PCL Island	P-IP_20190508	7	7d_VANCOUVER-WHITTIER	115.5	Insufficient EGCS available and/or Alaska port operations	185.7	0.1%
PCL Island	P-IP_20190515	7	7d_WHITTIER- VANCOUVER	149.9	Insufficient EGCS available and/or Alaska port operations	135.8	0.3%
PCL Island	P-IP_20190522	7	7d_VANCOUVER-WHITTIER	113.8	Insufficient EGCS available and/or Alaska port operations	175.1	0.2%
PCL Island	P-IP_20190529	7	7d_WHITTIER- VANCOUVER	157.0	Insufficient EGCS available and/or Alaska port operations	138.1	0.2%
PCL Island	P-IP_20190605	7	7d_VANCOUVER-WHITTIER	68.4	Insufficient EGCS available and/or Alaska port operations	201.2	0.3%
PCL Island	P-IP_20190612	7	7d_WHITTIER- VANCOUVER	105.0	Insufficient EGCS available and/or Alaska port operations	188.2	0.7%
PCL Island	P-IP_20190619	7	7d_VANCOUVER-WHITTIER	82.7	Insufficient EGCS available and/or Alaska port operations	203.0	0.1%
PCL Island	P-IP_20190626	7	7d_WHITTIER- VANCOUVER	146.6	Insufficient EGCS available and/or Alaska port operations	165.0	0.1%
PCL Island	P-IP_20190703	7	7d_VANCOUVER-WHITTIER	61.9	Insufficient EGCS available and/or Alaska port operations	230.8	0.3%
PCL Island	P-IP_20190710	7	7d_WHITTIER- VANCOUVER	141.6	Insufficient EGCS available and/or Alaska port operations	162.4	0.0%
PCL Island	P-IP_20190717	7	7d_VANCOUVER-WHITTIER	75.0	Insufficient EGCS available and/or Alaska port operations	230.8	0.6%
PCL Island	P-IP_20190724	7	7d_WHITTIER- VANCOUVER	118.4	Insufficient EGCS available and/or Alaska port operations	190.9	0.0%
PCL Island	P-IP_20190731	7	7d_VANCOUVER-WHITTIER	62.7	Insufficient EGCS available and/or Alaska port operations	241.3	0.3%
PCL Island	P-IP_20190807	7	7d_WHITTIER- VANCOUVER	115.4	Insufficient EGCS available and/or Alaska port operations	195.4	0.1%
PCL Island	P-IP_20190814	7	7d_VANCOUVER-WHITTIER	77.7	Insufficient EGCS available and/or Alaska port operations	249.7	0.2%
PCL Island	P-IP_20190821	7	7d_WHITTIER- VANCOUVER	120.7	Insufficient EGCS available and/or Alaska port operations	137.7	7.9%
PCL Island	P-IP_20190828	7	7d_VANCOUVER-WHITTIER	67.3	Insufficient EGCS available and/or Alaska port operations	242.5	0.0%
PCL Island	P-IP_20190904	7	7d_WHITTIER- VANCOUVER	127.1	Insufficient EGCS available and/or Alaska port operations	164.8	0.0%
PCL Island	P-IP_20190911	5	7d_VANCOUVER-VANCOUVER	10.9	Insufficient EGCS available and/or Alaska port operations	182.1	0.0%

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IV.C.2.b . Analysis of the DG Running Hours for the Alaska Itineraries

Golden Princess

				IV.C.2.b - DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
PCL Golden	P-NP_20190507	7	7d_VANCOUVER-VANCOUVER	489.0	Insufficient EGCS available and/or Alaska port operations	124.4	0.1%
PCL Golden	P-NP_20190514	4	4d_VANCOUVER-VANCOUVER	137.7	Insufficient EGCS available and/or Alaska port operations	134.2	0.1%
PCL Golden	P-NP_20190518	7	7d_VANCOUVER-WHITTIER	342.9	Insufficient EGCS available and/or Alaska port operations	145.3	2.6%
PCL Golden	P-NP_20190525	7	7d_WHITTIER- VANCOUVER	361.5	Insufficient EGCS available and/or Alaska port operations	107.6	1.6%
PCL Golden	P-NP_20190601	7	7d_VANCOUVER-WHITTIER	331.4	Insufficient EGCS available and/or Alaska port operations	151.2	0.3%
PCL Golden	P-NP_20190608	7	7d_WHITTIER- VANCOUVER	375.9	Insufficient EGCS available and/or Alaska port operations	103.7	0.1%
PCL Golden	P-NP_20190615	7	7d_VANCOUVER-WHITTIER	333.5	Insufficient EGCS available and/or Alaska port operations	150.5	1.3%
PCL Golden	P-NP_20190622	7	7d_WHITTIER- VANCOUVER	412.5	Insufficient EGCS available and/or Alaska port operations	67.9	0.5%
PCL Golden	P-NP_20190629	7	7d_VANCOUVER-WHITTIER	410.9	Insufficient EGCS available and/or Alaska port operations	74.5	1.1%
PCL Golden	P-NP_20190706	7	7d_WHITTIER- VANCOUVER	434.6	Insufficient EGCS available and/or Alaska port operations	52.6	0.4%
PCL Golden	P-NP_20190713	7	7d_VANCOUVER-WHITTIER	402.6	Insufficient EGCS available and/or Alaska port operations	73.1	0.1%
PCL Golden	P-NP_20190720	7	7d_WHITTIER- VANCOUVER	430.3	Insufficient EGCS available and/or Alaska port operations	51.6	1.3%
PCL Golden	P-NP_20190727	7	7d_VANCOUVER-WHITTIER	262.8	Insufficient EGCS available and/or Alaska port operations	39.8	2.4%
PCL Golden	P-NP_20190803	7	7d_WHITTIER- VANCOUVER	389.8	Insufficient EGCS available and/or Alaska port operations	78.1	0.1%
PCL Golden	P-NP_20190810	7	7d_VANCOUVER-WHITTIER	320.0	Insufficient EGCS available and/or Alaska port operations	147.6	0.6%
PCL Golden	P-NP_20190817	7	7d_WHITTIER- VANCOUVER	389.4	Insufficient EGCS available and/or Alaska port operations	102.4	0.1%
PCL Golden	P-NP_20190824	7	7d_VANCOUVER-WHITTIER	319.9	Insufficient EGCS available and/or Alaska port operations	145.4	0.2%
PCL Golden	P-NP_20190831	7	7d_WHITTIER- VANCOUVER	378.4	Insufficient EGCS available and/or Alaska port operations	99.9	0.2%
PCL Golden	P-NP_20190907	7	7d_VANCOUVER-WHITTIER	337.4	Insufficient EGCS available and/or Alaska port operations	136.7	0.6%
PCL Golden	P-NP_20190914	7	7d_WHITTIER- VANCOUVER	389.1	Insufficient EGCS available and/or Alaska port operations	103.9	0.0%
PCL Golden	P-NP_20190921	4	4d_VANCOUVER-VANCOUVER	152.8	Insufficient EGCS available and/or Alaska port operations	132.1	0.1%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

Royal Princess

				IV.C.2.b - DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
PCL Royal	P-RP_20190511	7	7d_VANCOUVER-WHITTIER	50.5	insufficient EGCS available and/or Alaska port operations	203.2	17.4%
PCL Royal	P-RP_20190518	7	7d_WHITTIER-VANCOUVER	142.2	insufficient EGCS available and/or Alaska port operations	202.1	0.1%
PCL Royal	P-RP_20190525	7	7d_VANCOUVER-WHITTIER	92.3	insufficient EGCS available and/or Alaska port operations	252.4	0.2%
PCL Royal	P-RP_20190601	7	7d_WHITTIER-VANCOUVER	117.2	insufficient EGCS available and/or Alaska port operations	171.0	7.9%
PCL Royal	P-RP_20190608	7	7d_VANCOUVER-WHITTIER	81.0	insufficient EGCS available and/or Alaska port operations	253.0	0.1%
PCL Royal	P-RP_20190615	7	7d_WHITTIER-VANCOUVER	114.0	insufficient EGCS available and/or Alaska port operations	227.0	0.1%
PCL Royal	P-RP_20190622	7	7d_VANCOUVER-WHITTIER	79.7	insufficient EGCS available and/or Alaska port operations	245.2	0.1%
PCL Royal	P-RP_20190629	7	7d_WHITTIER- VANCOUVER	42.7	insufficient EGCS available and/or Alaska port operations	139.6	51.0%
PCL Royal	P-RP_20190706	7	7d_VANCOUVER-WHITTIER	80.5	insufficient EGCS available and/or Alaska port operations	245.1	0.1%
PCL Royal	P-RP_20190713	7	7d_WHITTIER-VANCOUVER	109.5	insufficient EGCS available and/or Alaska port operations	231.7	0.7%
PCL Royal	P-RP_20190720	7	7d_VANCOUVER-WHITTIER	78.1	insufficient EGCS available and/or Alaska port operations	238.5	0.8%
PCL Royal	P-RP_20190727	7	7d_WHITTIER-VANCOUVER	106.1	insufficient EGCS available and/or Alaska port operations	253.8	0.1%
PCL Royal	P-RP_20190803	7	7d_VANCOUVER-WHITTIER	74.1	insufficient EGCS available and/or Alaska port operations	246.5	0.1%
PCL Royal	P-RP_20190810	7	7d_WHITTIER-VANCOUVER	112.0	insufficient EGCS available and/or Alaska port operations	230.7	0.1%
PCL Royal	P-RP_20190817	7	7d_VANCOUVER-WHITTIER	77.2	insufficient EGCS available and/or Alaska port operations	270.9	0.5%
PCL Royal	P-RP_20190824	7	7d_WHITTIER-VANCOUVER	204.4	insufficient EGCS available and/or Alaska port operations	159.0	0.2%
PCL Royal	P-RP_20190831	7	7d_VANCOUVER-WHITTIER	135.8	insufficient EGCS available and/or Alaska port operations	206.1	0.1%
PCL Royal	P-RP_20190907	7	7d_WHITTIER-VANCOUVER	208.4	insufficient EGCS available and/or Alaska port operations	156.7	0.1%
PCL Royal	P-RP_20190914	3	3d_VANCOUVER-LOS ANGELES	28.5	insufficient EGCS available and/or Alaska port operations	175.2	0.1%
PCL Royal	P-RP_20190917	12	12d_LOS ANGELES-LOS ANGELES	191.2	insufficient EGCS available and/or Alaska port operations	678.2	0.2%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

Ruby Princess

				IV.C.2.b. DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
PCL Ruby	P-RU_20190423	12	12d_LOS ANGELES-LOS ANGELES	229.9	Insufficient EGCS available and/or Alaska port operations	641.6	0.1%
PCL Ruby	P-RU_20190511	7	7d_SEATTLE-SEATTLE	256.2	Insufficient EGCS available and/or Alaska port operations	336.3	0.2%
PCL Ruby	P-RU_20190518	7	7d_SEATTLE-SEATTLE	221.5	Insufficient EGCS available and/or Alaska port operations	330.3	0.6%
PCL Ruby	P-RU_20190525	7	7d_SEATTLE-SEATTLE	231.9	Insufficient EGCS available and/or Alaska port operations	322.5	0.0%
PCL Ruby	P-RU_20190608	7	7d_SEATTLE-SEATTLE	208.1	Insufficient EGCS available and/or Alaska port operations	331.1	0.1%
PCL Ruby	P-RU_20190615	7	7d_SEATTLE-SEATTLE	203.5	Insufficient EGCS available and/or Alaska port operations	329.6	0.1%
PCL Ruby	P-RU_20190622	7	7d_SEATTLE-SEATTLE	219.5	Insufficient EGCS available and/or Alaska port operations	332.5	0.2%
PCL Ruby	P-RU_20190629	7	7d_SEATTLE-SEATTLE	204.1	Insufficient EGCS available and/or Alaska port operations	334.3	0.1%
PCL Ruby	P-RU_20190706	7	7d_SEATTLE-SEATTLE	221.0	Insufficient EGCS available and/or Alaska port operations	330.9	0.1%
PCL Ruby	P-RU_20190713	7	7d_SEATTLE-SEATTLE	203.8	Insufficient EGCS available and/or Alaska port operations	331.5	0.3%
PCL Ruby	P-RU_20190720	7	7d_SEATTLE-SEATTLE	231.8	Insufficient EGCS available and/or Alaska port operations	333.4	0.1%
PCL Ruby	P-RU_20190727	7	7d_SEATTLE-SEATTLE	216.7	Insufficient EGCS available and/or Alaska port operations	334.4	0.0%
PCL Ruby	P-RU_20190803	7	7d_SEATTLE-SEATTLE	219.9	Insufficient EGCS available and/or Alaska port operations	336.6	0.0%
PCL Ruby	P-RU_20190810	7	7d_SEATTLE-SEATTLE	136.7	Insufficient EGCS available and/or Alaska port operations	338.0	17.8%
PCL Ruby	P-RU_20190817	7	7d_SEATTLE-SEATTLE	258.5	Insufficient EGCS available and/or Alaska port operations	322.7	1.1%
PCL Ruby	P-RU_20190824	7	7d_SEATTLE-SEATTLE	215.9	Insufficient EGCS available and/or Alaska port operations	312.5	5.4%
PCL Ruby	P-RU_20190831	7	7d_SEATTLE-SEATTLE	236.0	Insufficient EGCS available and/or Alaska port operations	292.9	9.9%
PCL Ruby	P-RU_20190907	7	7d_SEATTLE-SEATTLE	275.6	Insufficient EGCS available and/or Alaska port operations	312.6	0.2%
PCL Ruby	P-RU_20190914	7	7d_SEATTLE-VANCOUVER	270.0	Insufficient EGCS available and/or Alaska port operations	309.5	0.2%

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IV.C.2.b. Analysis of the DG Running Hours for the Alaska Itineraries

Star Princess

				IV.C.2.b. DG Hours U.S. ECA or VGP (Alaska included)			
Ship Name	CruiseCode	Cruise Days	Cruise Itinerary	(1) ECAorVGP MGO	Decision criteria for MGO	(2) ECAorVGP HFO_EGCSon	Not available data% (for IV.C.2.b)
PCL Star	P-TP_20190427	12	12d_LOS ANGELES-LOS ANGELES	404.5	Insufficient EGCS available and/or Alaska port operations	675.4	0.1%
PCL Star	P-TP_20190512	7	7d_VANCOUVER-SEATTLE	252.6	Insufficient EGCS available and/or Alaska port operations	278.5	0.1%
PCL Star	P-TP_20190519	7	7d_SEATTLE-SEATTLE	289.4	Insufficient EGCS available and/or Alaska port operations	262.7	0.0%
PCL Star	P-TP_20190526	7	7d_SEATTLE-SEATTLE	259.0	Insufficient EGCS available and/or Alaska port operations	296.3	0.1%
PCL Star	P-TP_20190602	7	7d_SEATTLE-SEATTLE	246.0	Insufficient EGCS available and/or Alaska port operations	297.2	0.1%
PCL Star	P-TP_20190609	7	7d_SEATTLE-SEATTLE	244.1	Insufficient EGCS available and/or Alaska port operations	295.9	0.0%
PCL Star	P-TP_20190616	7	7d_SEATTLE-SEATTLE	196.0	Insufficient EGCS available and/or Alaska port operations	349.0	1.6%
PCL Star	P-TP_20190623	7	7d_SEATTLE-SEATTLE	153.8	Insufficient EGCS available and/or Alaska port operations	285.6	21.4%
PCL Star	P-TP_20190630	7	7d_SEATTLE-SEATTLE	227.4	Insufficient EGCS available and/or Alaska port operations	353.4	2.1%
PCL Star	P-TP_20190707	7	7d_SEATTLE-SEATTLE	175.8	Insufficient EGCS available and/or Alaska port operations	371.0	0.9%
PCL Star	P-TP_20190714	7	7d_SEATTLE-SEATTLE	186.4	Insufficient EGCS available and/or Alaska port operations	355.9	2.3%
PCL Star	P-TP_20190721	7	7d_SEATTLE-SEATTLE	164.8	Insufficient EGCS available and/or Alaska port operations	379.8	0.1%
PCL Star	P-TP_20190728	7	7d_SEATTLE-SEATTLE	164.9	Insufficient EGCS available and/or Alaska port operations	383.8	0.1%
PCL Star	P-TP_20190804	7	7d_SEATTLE-SEATTLE	161.0	Insufficient EGCS available and/or Alaska port operations	364.7	8.5%
PCL Star	P-TP_20190811	7	7d_SEATTLE-SEATTLE	252.9	Insufficient EGCS available and/or Alaska port operations	325.1	2.2%
PCL Star	P-TP_20190818	7	7d_SEATTLE-SEATTLE	243.5	Insufficient EGCS available and/or Alaska port operations	375.4	2.6%
PCL Star	P-TP_20190825	7	7d_SEATTLE-SEATTLE	170.3	Insufficient EGCS available and/or Alaska port operations	385.5	0.1%
PCL Star	P-TP_20190901	7	7d_SEATTLE-SEATTLE	166.7	Insufficient EGCS available and/or Alaska port operations	383.4	0.6%
PCL Star	P-TP_20190908	7	7d_SEATTLE-SEATTLE	190.5	Insufficient EGCS available and/or Alaska port operations	383.9	0.7%
PCL Star	P-TP_20190915	7	7d_SEATTLE-SEATTLE	210.1	Insufficient EGCS available and/or Alaska port operations	372.5	0.3%

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Carnival Costa P&O P&O CRUISES PRINCESS CRUISES

Holland America Line AIDA CUNARD SEABOURN Fathom

U.S. Environmental Protection Agency (EPA)
Administrative Order on Consent
of 07 May, 2019

Annual Reporting, Section IV.C.4.
pH and Flow Monitoring Summaries

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IV.C. Annual Reporting

4. pH and Flow Monitoring Data Summaries:

a. Report of EGCS discharges for the vessels that operated in Alaska during that year's sailing season (through September 30) with the following information:

i. A summary of EGCS discharges for each vessel when operating in Alaskan waters in a manner that compares pH effluent data with the range of effluent limitations identified in IV.B.i of the 2019 AOC.

ii. A summary of Carnival's conclusions regarding the factors that result in exceedance of pH effluent limitations and Carnival's recommendations on how any of these factors might be addressed in the future.

iii. For each vessel, a comparison summary of the buffer water and seawater supply flow rates when (1) transiting in Alaskan waters, (2) when transiting or maneuvering in U.S. ports, harbors, and estuaries, and (3) when docked in U.S waters.

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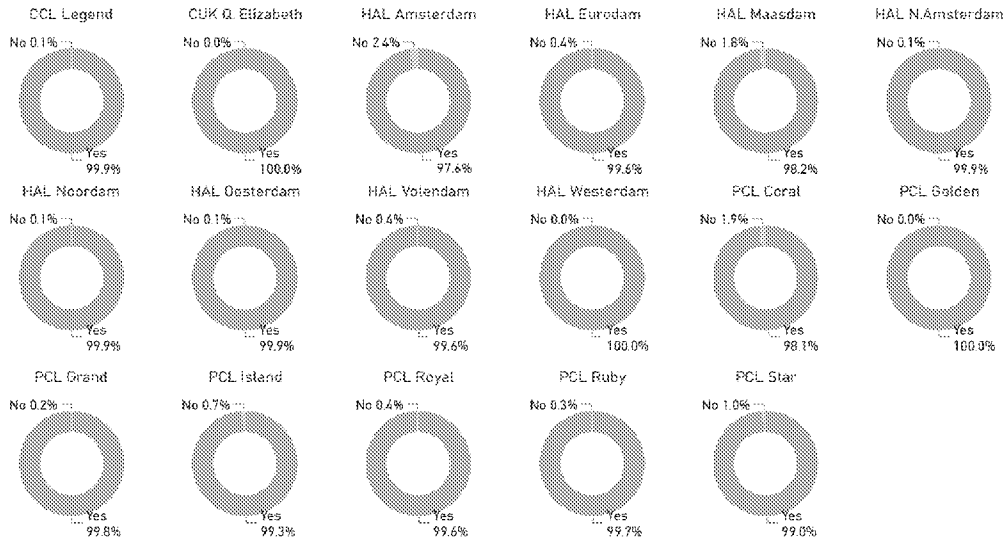
IV.C.4.a.i.

2019 pH Compliance in Alaska VGP: Ship Compliance Summary.



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IV.C.4.a.i.

2019 pH Compliance in Alaska VGP: pH Effluent Data Comparison

"Summary of EGCS discharges for each vessel when operating in Alaskan waters in a manner that compares pH effluent data with the range of effluent limitations identified in IV.B.I of the 2019 AOC."

Ship Name	*Total number of records*	*Number of Compliant records*	*Number of Not Compliant records*	*pH Compliant time%*	*pH Not Compliant time%*	*Not available data%*	*Compliance Comment*
CUK Q. Elizabeth	2289	2288	1	100.0%	0.0%	3.2%	one record out of compliance
HAL Westerdam	22105	22103	2	100.0%	0.0%	0.1%	two records out of compliance
PCL Golden	9275	9273	2	100.0%	0.0%	0.4%	two records out of compliance
HAL Oosterdam	25035	25022	11	99.9%	0.1%	0.1%	0.1% out of compliance (or 11 records - with ph in a range 4 – 5.5; 2 records are unreliable
HAL N.Amsterdam	17689	17666	23	99.9%	0.1%	0.6%	0.1% out of compliance (or 23 records - with ph in a range 4 – 5.5)
HAL Noordam	18522	18496	26	99.9%	0.1%	0.3%	0.1% out of compliance (or 26 records - with ph in a range 4 – 5.5)
PCL Grand	14214	14183	31	99.8%	0.2%	15.0%	0.2% out of compliance (or 31 records - with ph in a range 4 – 5.5)
CCL Legend	40388	40355	1	99.9%	0.1%	0.5%	32 records are unreliable, outside of range
HAL Eurodam	17966	17897	69	99.6%	0.4%	0.2%	0.4% out of compliance (or 69 records with ph in a range 4 – 5.5)
PCL Ruby	24790	24719	71	99.7%	0.3%	2.2%	0.3% out of compliance (or 71 records with ph in a range 4 – 5.5)
HAL Volendam	21162	21070	92	99.6%	0.4%	0.9%	0.4% out of compliance (or 92 records with ph in a range 4 – 5.5)
PCL Royal	37130	36993	123	99.6%	0.4%	3.5%	0.4% out of compliance (or 123 records with ph in a range 4 – 5.6; 14 records are unreliable
PCL Island	24928	24749	179	99.3%	0.7%	1.7%	0.7% out of compliance (or 179 records with ph in a range 4 – 5.6)
HAL Maasdam	15057	14789	268	98.2%	1.8%	0.7%	1.8% out of compliance (or 268 records with ph in a range 4 – 5.5)
HAL Amsterdam	11580	11297	283	97.6%	2.4%	0.2%	2.4% out of compliance (or 283 records with ph in a range 4 – 5.5)
PCL Coral	14524	14241	239	98.1%	1.9%	0.1%	1.9% out of compliance (or 239 records with ph in a range 4 – 5.5; 44 records are unreliable
PCL Star	28928	28638	290	99.0%	1.0%	0.4%	1% out of compliance (or 290 records with ph in a range 4 – 5.6)
Total	***345582***	***343779***	***1711***	***99.5%***	***0.5%***	***2.0%***	

Note: One record = every 3 minutes

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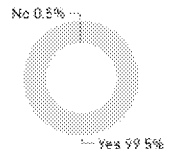
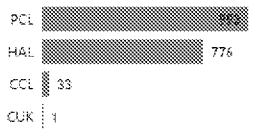
IV.C.4.ii
2019 pH Compliance in VGP Alaska: pH Exceedance Factors and Distribution

pH COMPLIANCE



Not compliant records by Brand



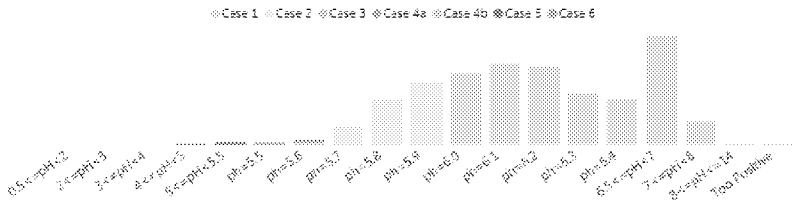
pH Compliance details - Alaska Rules

Case	Details	# records
Case 1	VGP limit compliant	266837
Case 2	Interim Effluent limit 5.7 compliant	72260
Case 3	pH difference 2.0 compliant	1162
Case 4a	Interim Effluent limit 10% compliant	3119
Case 4b	Not compliant	93
Case 5	Not compliant pH<5.5	1612
Case 6	Unexpected or null	33

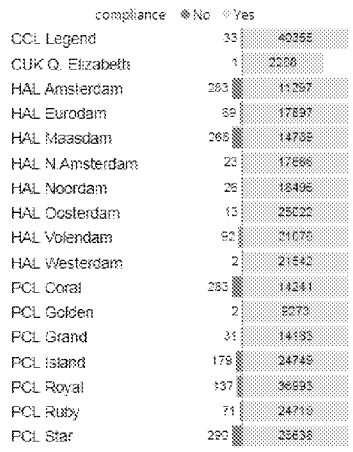
Total number of not compliant records

3803

pH values distribution



pH COMPLIANCE records by Ship



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IV.C.4.ii.

2019 pH Compliance in Alaska VGP: Summary of Exceedance Factors

"Summary of Carnival's conclusions regarding the factors that result in exceedance of pH effluent limitations and Carnival's recommendations on how any of these factors might be addressed in the future."

Non-compliant records are divided into the following root cause families:

- **Sensor issues:**
  The reliability of pH sensors onboard has continued to improve year over year and is no longer a significant issue. There are frequent times however when crew calibration checks will send a sensor to a pH of 4.0 or 7.0, usually for only one record. These are easy to differentiate and not considered non-compliant.
- **Transition:**
  Delays in sensor stabilizing after engine start, EGCS start, or rapid engine load changes are common; Carnival procedures (following IMO Circular 883) allow time to stabilize without a violation.
- **Low buffering flow rate:**
  When the buffering pump is manually set at a flow rate too low to manage the current fuel sulfur and engine load a non-compliant situation can develop with alarm. We are making auto mode the standard for this pump.
- **Low ambient pH waters:**
  A transit into low pH ambient waters (e.g. Skagway) with the buffering pump not in automatic can lead to a non-compliance alarm. Again we are making auto mode control of the buffering pump as the standard.
- **Erratic gas analyzer:**
  Erratic SO2/CO2 readings can cause erratic seawater flow rates in response, resulting in erratic pH levels that the buffering pump may not be able to react to quickly enough to avoid an alarm. We now have redundant SO2/CO2 gas analyzers on most ships to be able to switch to the most stable source.

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IV.C.4.iii.

2019 pH Compliance in Alaska VGP: Flow Rate Data Summary, with Average Rates

"For each vessel, a comparison summary of the buffer water and seawater supply flow rates when (1) transiting in Alaskan waters, (2) when transiting or maneuvering in U.S. ports, harbors, and estuaries, and (3) when docked in U.S waters."

	IV.C.4.a.iii (1) _Transit VGP Alaska		IV.C.4.a.iii (2)_Maneuver US VGP		IV.C.4.a.iii (3)_ Port US VGP	
Ship Name	*Average of Seawater Supply Flow Rate [m^3/h]*	*Average of Buffer Water Flow Rate [m^3/h]*	*Average of Seawater Supply Flow Rate [m^3/h]*	*Average of Buffer Water Flow Rate [m^3/h]*	*Average of Seawater Supply Flow Rate [m^3/h]*	*Average of Buffer Water Flow Rate [m^3/h]*
CCL Legend	471	1908	449	1903	428	1995
CUK Q. Elizabeth	602	689	607	513		
HAL Amsterdam	392	637	393	562	359	321
HAL Eurodam	446	1083	414	1033	370	936
HAL Maasdam	370	391	332	378	348	397
HAL N.Amsterdam	402	627	394	551	438	487
HAL Noordam	326	1088	337	1044	320	978
HAL Oosterdam	487	1002	481	858	470	763
HAL Volendam	289	767	279	753	273	842
HAL Westerdam	390	1238	421	1261	466	1266
PCL Coral	572	912	529	610		
PCL Golden	431	684	430	710		
PCL Grand	519	940	499	902		
PCL Island	554	1183	510	1044	548	1174
PCL Royal	683	859	639	717	601	415
PCL Ruby	506	1025	485	1066	471	1127
PCL Star	435	483	437	523	451	423

Note:
No data indicates no EGCS operation inside US ports for some vessels

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Message

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 12/8/2017 2:40:26 PM
To: Faulk, Jack [Faulk.Jack@epa.gov]; Sayers-Fay, Andrew L (DEC) (andrew.sayers-fay@alaska.gov) [andrew.sayers-fay@alaska.gov]
CC: 2tomdow Ex. 6 Personal Privacy (PP) Valerie Chatterley Ex. 6 Personal Privacy (PP) [vchatterley Ex. 6 Personal Privacy (PP)
Subject: RE: Confirmation of salinity/conductivity sensor

Jack, good to hear, thanks.

For Andrew: is it ok for you also?

Thanks, Mike

From: Faulk, Jack [mailto:Faulk.Jack@epa.gov]
Sent: Friday, December 08, 2017 9:39 AM
To: Kaczmarek, Michael (CarnCorp); Sayers-Fay, Andrew L (DEC) (andrew.sayers-fay@alaska.gov)
Cc: 2tomdow Ex. 6 Personal Privacy (PP); Valerie Chatterley Ex. 6 Personal Privacy (PP)
Subject: RE: Confirmation of salinity/conductivity sensor

Hi Mike,

I had someone here look into the salinity/conductivity sensor and they confirmed that it is an appropriate sensor for measuring conductivity/salinity. Thanks.

Jack

From: Kaczmarek, Michael (CarnCorp) [mailto:MKaczmarek@carnival.com]
Sent: Tuesday, December 05, 2017 11:44 PM
To: Faulk, Jack <Faulk.Jack@epa.gov>; Sayers-Fay, Andrew L (DEC) (andrew.sayers-fay@alaska.gov) <andrew.sayers-fay@alaska.gov>
Cc: 2tomdow Ex. 6 Personal Privacy (PP) Valerie Chatterley Ex. 6 Personal Privacy (PP) <vchatterley Ex. 6 Personal Privacy (PP)
Subject: Confirmation of salinity/conductivity sensor

Dear Jack, Andrew;
Please note further below the EGCS inlet water sensors already installed or will be installed for the next summer season in Alaska, for data gathering for SEP (Supplemental Environmental Project) purposes. *Please also confirm that what is proposed for salinity/conductivity in particular is OK* – we are also asking the candidate SEP analysis companies for comment.

The current situation for "Rack 1" (inlet) is:

1. pH meter: already installed on all except 1-2 of next season's 15 EGCS ships; will be installed on all.
2. Turbidity: already installed on all EGCS ships.
3. Temperature: already installed on most EGCS ships; we intend to install on all.
4. **Salinity/Conductivity**: not yet installed, but we intend to install on most/all Alaska ships.

Regards,
Mike

From: Paolo Gemme [mailto:gemme@ecospray.eu]
Sent: Tuesday, December 05, 2017 10:00 AM
To: Kaczmarek, Michael (CarnCorp)
Cc: Porcellacchia, Franco (CarnCorp); Maurizio Archetti; Emanuele Gariboldi; Tyrrell, James (CUK); Galati, Vincenzo (Contractor)
Subject: R: Draft SEP RFP

Dear Mike,

I'm attaching here the manuals of the instruments actually installed for the measurements below:

pH
Supplier: HACH
Model: pHD sc
Code: DPD2P1.99
Range: -2.0 ÷ 14.0 pH
Accuracy: ±0.02 pH

Turbidity
Supplier: HACH
Model: ULTRATURB sc
Code: LPV415.99.32001
Range: 0.0001 ÷ 1000 FNU
Accuracy: ±0.008 FNU

Temperature
Supplier: Endress Hauser
Model: Omnigrad M TR12
Code: TR12-ABY0SEB20000
Range: -200 ÷ 600 °C
Accuracy: ± 0.15 + 0.002 · |t| (absolute temperature ➔ if max 40° = ± 0.23 °C)

Concerning the salinity sensor HACH proposal is to use the Conductivity sensor as this can be configured for measuring TDS (Total Dissolved Solids). This is the same instrument once installed on Rack01 I'm attaching here the manual of the sensor with highlighted the ref. to TDS.

Salinity
Supplier: HACH
Model: 3700 sc Inductive Conductivity sensor
Code: 3725E2T
Range: 2 ÷ 42 psu
Accuracy: ± 0,5% of reading

This instrument will be able to measure the so called "practical salinity" which is related to conductivity through a standard factor (considering all the ions as KCl, the unit of measure is psu = practical salinity unit). I found out this is a standard way to measure salinity for seawater, a real measure of salinity can be done only in the laboratory. More info at the following link:

http://www.fondriest.com/environmental-measurements/parameters/water-quality/conductivity-salinity-tds/

We remain at Your disposal for any further clarification,
Thanks and Regards,

Paolo GEMME
(Service Manager)

Ecospray Technologies S.r.l.
Via Circonvallazione, 14
15050 Alzano Scrivia - AL
Italy

Tel: +39 0131 854611 - ext 603
Mob: +39 392 9122718
Fax: +39 0131 854617
Skype: paolo.gemme
Web: www.ecospray.eu

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US EPA Administrative Order on Consent of 07 May, 2019
Section IV.D.1.

Operational Challenges Report

Introduction.

Requirements of Section IV.D.1: "No later than October 31 of each year, beginning in 2019, provide a summary of challenges encountered with the use of EGCS equipment and associated procedures during that year's sailing season on any vessel operating in Alaska. Identify actions taken or planned to address these challenges. Exclude any challenges reported pursuant to IV.C.4.a.ii. of the 2019 AOC."

Background: This is a new report, intended to examine technical and/or operational challenges in the third season of Alaska operations by the Carnival group ships while operating under 2019 AOC terms;

Of interest, some considerations affecting EGCS performance during the 2019 Alaska season were:

1. EGCS availability rates: By 2019 many of the 16 ships operating in Alaska during the 2019 sailing season had been operating with EGCS for years, and were able to realize very high system availability rates, averaging over 90% for the season.
2. Transit usage rates: Similar to the availability rates, the EGCS usage rates during ship transits between ports were also very high.
3. Ship's pH control systems: Almost all Carnival group ships operating in Alaska had been modified with additional pump motor capacity, increased pipe sizes and other changes to provide higher volumes of EGCS washwater buffering water, and had automation upgrades that allowed variable buffering water control to manage the buffering water flow rates to maintain a pH level set point target.
4. Crew experience: Crew experience with operating the onboard EGCS, and the number of crewmembers that have attended Carnival's formal EGCS course in the Carnival CSMART training facility in Almere, Netherlands has continued to grow since the beginning of the 2017 season.
5. Certified systems: All EGC systems for the 16 Carnival group ships operating in Alaska in 2019 were certified prior to the beginning of the season.
6. Neptune coverage. Almost all of the 16 Carnival group ships operating in Alaska during the 2019 season were continuously connected to the Neptune data gathering and reporting system.
7. Supplemental Environmental Project (SEP) Instrumentation: Almost all of the Carnival group ships operating in Alaska during the 2019 season had the additional instrumentation installed and operating before the start of the 2019 summer season- in accordance with the 2017 AOC.

In aggregate, these elements, coupled with the reduced pH discharge levels contained in the terms of the 2019 AOC, provided the expectation of improved pH performance along with overall EGCS performance in Alaska in 2019.

Also, early in the 2019 Alaska sailing season a corporate policy was established for all Carnival group ships to switch to MGO (Marine Gasoil) while berthed in Alaska ports during the entire season, in response to concerns from ADEC to reduce the amount of visible smoke experienced and monitored by State observers in these ports.

Section IV.D.1. Operational Challenges Report

07 May, 2019 Administrative Order on Consent (AOC).

With the above background in mind, some challenges were experienced in the areas of visible smoke in port, surface effects in port, with pH limits when using higher sulfur fuel, and from air/water monitoring instrumentation during the 2019 sailing season:

1. **Visible smoke in Alaska ports.**

   In addition to generating complaints from residents in Alaska ports, visible smoke is monitored in some Alaskan ports by ADEC (Alaska Department of Environmental Conservation) observers certified in EPA Method 9 (Visual Determination of the Opacity of Emissions from Stationary Sources). In some cases these opacity readings have led to a notice of violation and a resultant fine.
   There were two types of issues during the 2019 Alaska sailing season which generated either resident complaints or ADEC notices; neither situation was unique to Carnival group ships but were also experienced by the other major cruise companies in Alaska. They were:

   a. **Visible smoke due to "white plume".** "White plume" is the term used to describe the steam-like effect experienced under certain environmental conditions when warm moist post-EGCS exhaust gases encounter cooler ambient air when leaving the funnel, and the water vapor condenses to create a visible white condensate plume. This can be a short (as normally experienced on Carnival ships) or long plume and is most prominent on ships with hybrid EGCS in closed loop mode, due to the moister exhaust.

      Comments: EGCS is an efficient smoke-reduction tool under typical operating conditions as it removes most of the exhaust components that result in visible

smoke, e.g. particulate matter, SO2, and SO3, etc. The most efficient EGCS towers will minimize the water vapor remaining in the exhaust and the subsequent potential formation of white plume. Experienced operators will also be able to manage the amount of seawater needed to meet regulatory standards as another effective way to minimize the potential for visible white plume. There are mechanical "plume arrester" modifications available but our experience is that they are expensive to fit and provide marginal benefit.

b. **Visible smoke due to MGO use with engines at low loads**.
To avoid potential notices of violation and public concerns related to a visible "white plume" the Carnival group elected to only use marine gasoil (MGO) in Alaska ports for most of the 2019 Season. In some ports (e.g. Juneau) ships were instructed to switch fuels or engines before the start of maneuvering while entering port and also during maneuvering on departure. However, when operating diesel-electric plants at low maneuvering speeds with more than one engine (engine redundancy is needed for safety) the shared engine load is very low and in an inefficient range, which creates black smoke, especially during changes of speed during in-port maneuvering. Once alongside the pier the full load is shifted to one engine at a higher, more efficient load range and little or no smoke is typically seen until the ship restarts additional engines again for departure maneuvering.

Comment: We tune all engines before the summer season for most fuel-efficient operations with low/no visible smoke. Some engines without EGCS installed are tuned specifically for MGO use. There is no other viable way to remedy the issue of black smoke during maneuvering because the ships are already using the least number of engines for maneuvering that safety allows (at least two).

Note: We are currently testing a new technology fitted in exhaust pipes that we believe may be effective in reducing the visible signature of all types of smoke, including white plume.

2. Surface effects in port.

Early in the 2019 season we had a few reports of surface effects seen by the ships in Alaskan ports, and we investigated each for causes as we have done in the previous seasons. The results were the same as seen before:

Due to the very high volumes of buffering seawater needed to meet the VGP requirement of 6.0 pH at washwater discharge, or even the lower limit of 5.7 pH described in the 2019 AOC, there is risk of disturbing the water surface outboard of the discharge point and potentially creating a "surface effect": typically a surface foam, which eventually breaks down to temporarily leave a grayish film on the surface. Either of these effects, the surface foam and gray film, though benign and common to disturbed surface water, may attract the attention of port workers or visitors. This is especially true in mid-late summer in northern latitudes, when algae presence increases, and the algae can leave a gray, brown or even black tint to the foam created by disturbed water.

Comment: All Carnival group ships operating in Alaska carried washwater sample kits and were prepared to take water samples of any surface effect seen. All samples that were taken were evaluated by laboratory in Juneau or Vancouver; all tested well below all VGP limits for EGCS or other overboard discharges.

Note: After Carnival group ships shifted to MGO use in Alaska ports, only one further surface effect event was experienced, in port in Victoria, BC.

3. Higher sulfur fuels use with EGCS.

A few of the Carnival ships operating in Alaska in 2019 arrived in Alaska directly from California or Asia, with higher sulfur fuel than the 2.0% sulfur contract that we normally put in place in Vancouver and Seattle for supplying Alaska operations. One example is Ruby Princess, which arrived in Alaska with about 3.0% sulfur fuel, and which had some challenges in meeting the pH requirements in the northern areas of the Inside Passage, and especially in Skagway, which has a lower ambient pH level (7.7-7.9 pH) due to river outflows into the constricted area at the head of the Lynn Canal.

Comment: Like most of the rest of the Carnival group fleet in Alaska in 2019, Ruby Princess had completed modifications in the off-season to increase its buffering water capacity, and by using this new capacity was able to manage pH within the 2019 AOC limits. We should note, however, that as we get closer to 01 January 2020 the sulfur content of heavy fuels available in North American bunkering ports will continue to rise as suppliers use lower sulfur HFO for blend stock to mix with MGO for a high demand 0.5% Low Sulfur Fuel Oil (LSFO) product. At that point some ships with less efficient EGCS will likely struggle to meet the normal VGP pH washwater discharge requirement of 6.0, and even the 2019 AOC limit of 5.7 pH. For this reason we have launched an

EGCS tower efficiency campaign, to survey over 200 towers in the Carnival fleet and evaluate those with lower efficiencies to determine design modifications needed to reach or return to peak efficiency.

4. Exhaust gas or washwater monitoring instruments failure.

Carnival ships operating in Alaska had a greatly reduced number of exhaust gas and water monitoring instrument failures during the 2019 Alaska season. This improvement was due to increasing reliability from constant use, from manufacturer's upgrades to the systems, and also from improved maintenance and rising skill levels of onboard engineers. The greatest instrument challenge continues to come from gas analyzers, which are installed above the EGCS towers to measure the remaining levels of sulfur in the engine exhaust, as is required on a continuous basis for these ships operating under Scheme B of the MEPC Guidelines (**MEPC.291(71) adopted on 7 July 2017)**.

Comments: During the last winter season we conducted an upgrade and redundancy campaign for gas analyzers, installing a second gas analyzer on most ships including those planned for the Alaska trade. We also strengthened our complement of onboard spares, requiring a set of "critical spares" to be held onboard, including a pH probe and other key instruments. And finally, IMO Circular 883 of 21 May 2019 included provisions for continued operations without violation in case of short term exceedance or where one instrument fails or becomes unreliable as long as the other instruments are still working normally and within compliance. Together, improved instrument reliability, gas analyzer redundancy, onboard spares, training, and the IMO Circular have combined to improve pH and overall EGCS performance in Alaska during the 2019 sailing season.

Summary.

Regardless of these challenges, Carnival group ships were able to realize a high level of EGCS availability (i.e. systems status) operations performance during the 2019 Alaska sailing season, as well as high transit usage rates and a record low number of pH limit variances:

- Average EGC system availability across all 16 Carnival group ships: **93 %.**
- Total pH limit variance in Alaska VGP including all 16 ships: **0.5%** (before event analysis).

The level of reliable EGCS performance during the 2019 Alaska sailing season was an encouraging preparation for Global ECA, North American ECA, and VGP/VIDA operations in 2020.

US EPA Administrative Order on Consent of 07 May, 2019
Section IV.C.1.

Report Evaluating Alternatives

US EPA ADMINISTRATIVE ORDER ON CONSENT of 07 May, 2019
Section IV.C.1. Report Evaluating Alternatives

Introduction

This *"Report Evaluating Alternatives"* is intended to start from the same report provided for the 2017 Administrative Order on Consent (AOC), dated 31 October, 2017, and to re-consider and evaluate the same and any potentially new practical alternatives that may be used to achieve compliance with the U.S. Vessel General Permit (VGP) pH limit for exhaust gas cleaning system (EGCS) washwater.

The original 28 August, 2017 Administrative Order on Consent, Section IV.1. described the terms of the Report as follows:

IV.I. Report Evaluating Alternatives

1. **"No later than October 31, 2017, Carnival shall prepare and submit to EPA, a report that evaluates alternatives to achieve compliance with the VGP pH limit for EGCS washwater ("Alternatives Report"). The Alternatives Report shall identify and describe the alternatives considered/evaluated to achieve compliance with the VGP requirements for EGCS. At a minimum, the alternatives included in the Alternatives Report shall include:**

   a. **Use of 0.1% sulfur fuel.**

   b. **Reducing engine loads (e.g. below 70%) to reduce exhaust volumes per engine.**

   c. **Use of a waste stream operation from other ship operations.**

   d. **Use of a closed loop system.**

   e. **Disposal at port (either onshore or to a treatment vessel).**

   f. **Increase of buffer water flowrate.**

   g. **Use of neutralizing chemicals."**

<u>This current Report, per Section IV.C.1. of the 07 May, 2019 Administrative Order on Consent, is based on the following terms:</u>

IV.C.1. Report Evaluating Alternatives

a. **In 2019 and 2020, no later than August 15 of each year, Carnival shall prepare and submit to EPA and updated and expanded version of the alternatives report previously submitted in accordance with Section IV.I. of the 2017 AOC. This new version of the report shall include:**

i. Updated technical feasibility and cost estimates for deployment of the alternatives described in Section IV.I.1. of the 2017 AOC; and
ii. For any new or emerging alternative identified by EPA or Carnival, a description of the alternative, the technical feasibility, and a cost estimate.

Section IV.C.1. Report Evaluating Alternatives

07 May, 2019 Administrative Order on Consent (AOC):

Note: This evaluation reconsiders the same alternatives evaluated in 2017 from the perspective of two additional years of operational EGCS experience in VGP waters with over 50 EGCS-equipped ships, and the results are discussed below. Although open to and looking for new alternatives to evaluate, wet did not find any additional practical options.

a. **Use of 0.1% sulfur fuel throughout the voyage within waters subject to the VGP. This shall discuss considerations of using low sulfur (0.1%) fuel in limited circumstances (e.g., in port or in National Parks) and higher sulfur fuel (with scrubbers) in other less sensitive areas. This shall also discuss the same analyses using multi-grade fuels, or a combination of low sulfur and multi-grade fuels. The analyses shall include descriptions of procedural, technical and financial implications for Alaskan voyages (e.g., difference in quality of fuels, Btu values, bunkering, etc.)."**

Discussion: Carnival ships carry both HFO (heavy fuel oil, or IFO 380) with up to 3.5% sulfur content (2.0% typical maximum in Alaska) and MGO (marine gasoil) with up to 0.1% sulfur content. Although the preferred practice is to use HFO + EGCS during transits and port visits, MGO is currently also used in special interest areas like Glacier Bay by agreement. Some points:

- As It has been demonstrated and published that the HFO/EGCS combination is capable of reducing visible smoke and particulate matter (PM), including black carbon, into the range of MGO and well below that of 0.5% sulfur VLSFO (very low sulfur fuel oil), the HFO/EGCS combination should be considered an environmentally and aesthetically appropriate choice for special interest areas like Yakutat and Glacier Bay. With exhaust SO2 levels at or below MGO, particulates are reduced by 60-90%, including black carbon and PAHs, and reduced NOx compared to MGO, EGCS + HFO is fully compatible with sensitive areas, including in the vicinity of glaciers.
- Combining HFO (high sulfur content) and MGO, known as "blending" is not a recommended solution onboard ship for several reasons, including:
  - HFO and MGO are often not compatible, and the compatibility is best determined ashore by trained personnel using approved procedures.
  - Specialized equipment is needed to create a homogeneous mixture, which is necessary to ensure adequate lubricity at the fuel pumps and acceptable viscosity at injection.
- Carnival manages fuel quality by bunkering for Alaska cruises only with known and established fuel distributors in Vancouver and Seattle. Fuel sample test results are provided with the Bunker Delivery Notes, and the Carnival group ships in Alaska also take their own samples for analysis with each bunker load.

Technical feasibility: There is no major technical barrier to burning MGO, as most ships have installed the seals, pumps, cooling systems and viscosimeters needed to accommodate this. However, all of these engines on Carnival group ships were designed, configured and tuned for HFO use, and are less efficient when using MGO.

Cost: at today's fuel prices the cost difference between using all MGO vs. all HFO for the 16 Carnival ships in Alaska would exceed $2,500,000 per week.

b. Reducing engine loads (e.g., below 70%) to reduce exhaust volumes per engine.

Discussion: All Carnival ships operating in Alaska and North America are diesel-electric; that is, all have between four and six medium-speed diesel engines powering alternators that provide electrical power for all ship needs, both propulsion and hotel load. This means that the current total electrical demand for the ship must be met by adjusting the number of engines and the engine loads. The most efficient operation of these engines varies by engine type but is typically between 75-85% load; this is the range that the timing and turbocharger load curve are set for (for HFO) and where the most power (and least exhaust/pollutants) is generated for the least fuel consumption per unit power of kilowatts/hour (kWh).

Engine loads are often reduced to 70% or less to assist in achieving EGCS washwater discharge pH levels in VGP waters, but this is not an efficient operation: the engine will produce more CO2 and other pollutants per kWh than at optimum loads. Lowering loads may also mean that an extra engine must be brought on line to handle the total electrical demand, leading to three engines operating at inefficient loads versus two engines at efficient loads, with a resultant increase in overall fuel consumption and exhaust.

Technical feasibility: Using low engine loads is technically feasible and is a common technique used by ships engineers to help manage washwater discharge pH in VGP waters. However, this technique is not necessary nor commonly practiced in ECA waters outside VGP waters where IMO regulations with lower pH minimums are in effect We also note that we are investigating re-mapping the engines used most often in port to create a more efficient operation at the low loads typically needed in port, which would potentially save fuel, reduce CO2 per kWh in port, and reduce visible smoke.

Cost: The cost is related to operating at lower engine efficiency. The difference between operating at lower engine loads (60% or less) and optimum load range is about 6 g/kWh, a 3.0% increase in fuel usage. At today's fuel prices the extra cost is around $5,000/month per engine, or $75-90,000 per ship for the Alaska season.

c. Use of waste stream effluent from other ship operations that will be discharged, such as coolant wastewater, treated graywater, treated blackwater, treated ballast water, etc.

Discussion: Using a typical Carnival EGCS operation at around 500 metric tons (cubic meters) of seawater per hour for washwater, and 1200 metric tons per hour for buffering water, and presuming that this alternative is intended for use as buffering water:

- Treated gray water on a medium-size cruise ship (100,000GRT) is in the range of 800-1000 metric tons per day and is not a steady flow, so is only about 4% of the volume needed. As fresh water it also doesn't have the alkalinity needed for buffering water, without adding significant volumes of chemicals.
- Treated black water on the same size ship is only about 150 metric tons/day and not a steady flow, and again as with fresh water, not useful as buffering water.
- Ballast water is seawater with normal alkalinity and higher flow rates, in the range of 500mtons/hour, but is only discharged for short periods during de-ballasting, usually once per cruise before bunkering fuel. Similarly, ballasting is only done periodically during the cruise, as fuel levels decrease, and is therefore impractical for continuous use as buffering water. Ballast water is not normally needed to compensate for fresh water consumption due to regular onboard fresh water production.
- Engine cooling water, which is sourced from ambient seawater at the side of the ship, the same as EGCS washwater, has variable seawater flow rates of around 1000 metric tons/hour and can be a useful source to augment buffering water requirements. The advantage is avoidance or reduction in the use of an additional seawater pump dedicated for EGCS buffering water, with resultant energy savings. Especially in VGP waters, which have higher buffering water requirements to achieve pH limits, engine cooling water cannot usually be considered reliable as a sole source due to the flow rate variability, which is dependent on seawater and engine temperatures (lower flows are normal in cooler climates and seawater conditions). Note that Carnival does already use this source in a number of ships for additional supply or for smaller engines when EGCS pumps are located near the cooling water crossover piping.

Technical feasibility: Engine cooling water is the only other feasible source of buffering water, and is already in use on some ships with smaller engine sizes and is planned for use on some ships when relative locations make it practical and useful method to augment sea chest seawater supplies. It is however limited by variable flow rates that are based on current seawater and engine temperatures.

Cost: There is no significant extra cost of using the engine cooling water source when located reasonably close to the EGCS pump room; otherwise there would be additional piping and installation costs.

d. Use of a closed loop system.

Discussion: Although Carnival has not installed any closed loop or hybrid systems Ecospray, the supplier of our EGCS, has designed and installed these for others, and we have carefully followed the progress of these as well as others installed by our cruise competitors. Some points:

- Closed loop systems can operate without much discharge and can manage pH levels with chemicals during the closed loop cycle.
- The closed loop process creates both bleed-off water, which must be filtered or treated before discharge, and sludge, which must be off-loaded to designated treatment facilities.
- The closed loop operation leaves a wetter exhaust that often creates a persistent plume of white smoke from the funnel, which draws the attention of local residents and authorities. Some of the exhaust tends to descend alongside the ship and when the ship is berthed in a public area passerby or businesses close by may smell a strong exhaust odor.
- Large quantities of hazardous chemicals (caustic soda) must be stored and handled onboard by crew members.
- Closed loop systems are expensive, complex, and more difficult to install, maintain and operate.
- Ships with hybrid systems are typically only conducting the closed loop operations in selected ports.

By comparison, Carnival's experience with open loop systems is:

- Less expensive to install, particularly across a large fleet, and relatively simple to maintain and operate.
- No health and safety risk to crew or guests from handling and storage of hazardous chemicals.
- No (or low) visible smoke levels in port or at sea.
- Clean wash water at discharge, with discharge water quality well within EGCS regulations as well as major national and international wastewater standards, even within EPA drinking water standards.

Technical feasibility: Modification to Closed Loop is technically feasible but often difficult to retrofit on older, smaller ships in particular due to space constraints. Additional equipment and piping, bleed water and sludge storage tanks and chemical storage and handling areas are needed.

Cost: due to the additional equipment, piping, tanks, etc. the cost of retrofitting an existing open loop system to hybrid/closed loop is an additional $1,500,000-1,800,000 per EGCS unit, or $3,000,000-5,000,000 per typical ship with three EGCS. The additional cost for installation on newbuilds is about the same.

e. Disposal at port (either onshore or to a treatment vessel).

Discussion: In terms of washwater during transit operations at sea, the volumes are simply too large to be stored onboard ship and retained until arrival in port. For in port discharge a large barge would be needed, in the range of 4000-5000 m^3 (cubic meters) to accommodate an average washwater discharge of 500m^3 over 8 hours in port. The only use of such a purpose of the barge would be to further treat pH levels and discharge to sea; many ports would have no way to accommodate these volumes as waste water.

As Carnival uses the Ecospray open-loop system there is no accumulated sludge to be discharged in designated reception facilities as with a closed loop system. However, Carnival does elect to use a fine mesh washwater filter during port operations and there is a washwater filter residue that is collected and dewatered in bag filters to a dry residue. Laboratory analysis of the dried filter residue, including standard tests for the determination of hazardous material, such as the leachate test, have concluded that the residue may be designated as non-toxic and the used filter bags disposed of as normal operational waste.

Technical feasibility: Offload to a barge, in ports where available, is feasible technically.

Cost: Not considering water treatment costs, the cost of this size barge is typically in the range of $9000/day, and likely to be more expensive in Alaska. For a typical cruise with 5 ports, the cost would be about $45-50,000 per ship per week, or $750,000 per week for the 15 Alaska ships; $15-17,000,000 for the Alaska season.

f. Increase of buffer water flowrate. This shall demonstrate the relationship of an increase in buffer water necessary to meet VGP and IMO pH limits and relative cost comparison for doing so.

Discussion: Most Carnival EGCS have Class-approved minimum pH limits of 4.0, as calculated per IMO guidance. As a general practice Carnival ships operate well above this with washwater discharges at or above 5.0pH while in ECA waters outside VGP waters, including European ports. Buffering seawater is not necessary to meet the minimum IMO discharge water pH limits and depending on fuel sulfur content, pH levels are consistently above 5.0pH without any additional buffering. For comparison, using the example of a 12MW engine at 70% load and with a fuel sulfur content of 2.0%, and operating in normal seawater of around 8.2pH, Carnival ships in Alaska may typically see:

- no buffering water will be needed to stay above IMO limits, and usually is not needed to remain above 5.0 pH at discharge.
- 200-400 m^3/hour of buffering water may be needed to maintain a pH of 5.5.
- 1000-1300 m^3/hour of buffer seawater will be needed to achieve and maintain a pH of 6.0 at discharge.

Note that these are typical numbers and actuals will vary by system and ship.

Technical feasibility: Technically feasible and system modifications to increase buffering water flow rates have already been implemented on all Alaska ships and most others operating in VGP waters. Further expansion of buffering capacity is possible but progressively more difficult due to onboard space restrictions. Note that the risk and scale of "surface effects" such as seafoam and film generated by seawater agitation increases with the buffering flow rates and can create concern with some observers.

Costs: The original 47 kW buffering pump motors on the Carnival EGCS ships have now been mostly replaced on Alaska/North America ships with 75 or 90kW motors for the purpose of meeting VGP limits. In IMO ECA waters outside VGP waters, the 47kW motors run between 0-50%, or about 22kW, but were always at full power in VGP waters. The newer pump motors are also always at full power in VGP waters with a corresponding increase in engine exhaust and CO2 emissions and an increased fuel cost between $50-90,000 per year per EGCS unit, or between $150,000-$270,000 per ship annually.

g. Use of neutralizing chemicals on the intake seawater and/or effluent that is discharged.

Discussion: There is some limited value gained by using chemicals in the washwater, post-scrubber tower, or before mixing with buffering water. Carnival has carried out several tests over the last several years on different ships to trial the insertion of different concentrations of sodium carbonate (soda ash) at several different points in the washwater stream. Sodium carbonate was used for these tests because of its high pH (slightly below caustic soda) but ease of safe handling onboard ship (unlike caustic).

Consistent findings from these trials were that, due to the flow rates of the EGCS washwater, large quantities and high concentrations of sodium carbonate chemicals were needed for even small (0.1 to 0.15pH) increases in washwater pH. Somewhat better results would be expected from use of caustic soda (NaOH), but due to safety concerns this was not trialed.

Technical feasibility: Use of neutralizing chemicals on the intake of seawater and/or effluent that is discharged is feasible, subject to restraints on space for equipment, mixing tanks and chemical storage. However, serious concerns exist related to safe handling of such chemicals on a routine, 24/7 basis.

Cost: Roughly speaking, we estimated that the cost of enough sodium carbonate needed for even marginally useful benefit would be about $350-400 per port visit with one engine. For two engines in use for a full day the minimum cost of chemicals would be about $700-800 per day. The minimum cost of dosing equipment and tankage can be estimated at around $300,000 per ship, installed.

US EPA ADMINISTRATIVE ORDER ON CONSENT of 07 May, 2019
Section IV.C.1. Report Evaluating Alternatives

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on any information I have and on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Michael Kaczmarek
Senior Vice President
Carnival Corporation & plc

18 October 2019
Date

Message

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 12/6/2017 4:44:11 AM
To: Faulk, Jack [Faulk.Jack@epa.gov]; Sayers-Fay, Andrew L (DEC) (andrew.sayers-fay@alaska.gov) [andrew.sayers-fay@alaska.gov]
CC: 2tomdow Ex. 6 Personal Privacy (PP) Valerie Chatterley Ex. 6 Personal Privacy (PP) [vchatterley Ex. 6 Personal Privacy (PP)
Subject: Confirmation of salinity/conductivity sensor
Attachments: Attachment 16 - SEA WATER ANALYSIS SYSTEM - TURBIDIMETER Manual.pdf; Attachment 13 - SEA WATER ANALYSIS SYSTEM - PHMETER Manual.pdf; E+H - TC12.pdf; allegato 1.pdf

Dear Jack, Andrew;
Please note further below the EGCS inlet water sensors already installed or will be installed for the next summer season in Alaska, for data gathering for SEP (Supplemental Environmental Project) purposes. *Please also confirm that what is proposed for salinity/conductivity in particular is OK* – we are also asking the candidate SEP analysis companies for comment.

The current situation for "Rack 1" (inlet) is:

1. pH meter: already installed on all except 1-2 of next season's 15 EGCS ships; will be installed on all.
2. Turbidity: already installed on all EGCS ships.
3. Temperature: already installed on most EGCS ships; we intend to install on all.
4. **Salinity/Conductivity**: not yet installed, but we intend to install on most/all Alaska ships.

Regards,
Mike

From: Paolo Gemme [mailto:gemme@ecospray.eu]
Sent: Tuesday, December 05, 2017 10:00 AM
To: Kaczmarek, Michael (CarnCorp)
Cc: Porcellacchia, Franco (CarnCorp); Maurizio Archetti; Emanuele Gariboldi; Tyrrell, James (CUK); Galati, Vincenzo (Contractor)
Subject: R: Draft SEP RFP

Dear Mike,

I'm attaching here the manuals of the instruments actually installed for the measurements below:

pH
Supplier: HACH
Model: pHD sc
Code: DPD2P1.99
Range: -2.0 ÷ 14.0 pH
Accuracy: ±0.02 pH

Turbidity
Supplier: HACH
Model: ULTRATURB sc
Code: LPV415.99.32001
Range: 0.0001 ÷ 1000 FNU
Accuracy: ±0.008 FNU

Temperature

Supplier: Endress Hauser
Model: Omnigrad M TR12
Code: TR12-ABY0SEB20000
Range: -200 ÷ 600 °C
Accuracy: ± 0.15 + 0.002 · |t| (absolute temperature ➔ if max 40° = ± 0.23 °C)

Concerning the salinity sensor HACH proposal is to use the Conductivity sensor as this can be configured for measuring TDS (Total Dissolved Solids). This is the same instrument once installed on Rack01 I'm attaching here the manual of the sensor with highlighted the ref. to TDS.

Salinity
Supplier: HACH
Model: 3700 sc Inductive Conductivity sensor
Code: 3725E2T
Range: 2 ÷ 42 psu
Accuracy: ± 0,5% of reading

This instrument will be able to measure the so called "practical salinity" which is related to conductivity through a standard factor (considering all the ions as KCl, the unit of measure is psu = practical salinity unit). I found out this is a standard way to measure salinity for seawater, a real measure of salinity can be done only in the laboratory. More info at the following link:

http://www.fondriest.com/environmental-measurements/parameters/water-quality/conductivity-salinity-tds/

We remain at Your disposal for any further clarification,
Thanks and Regards,

Paolo GEMME
(Service Manager)

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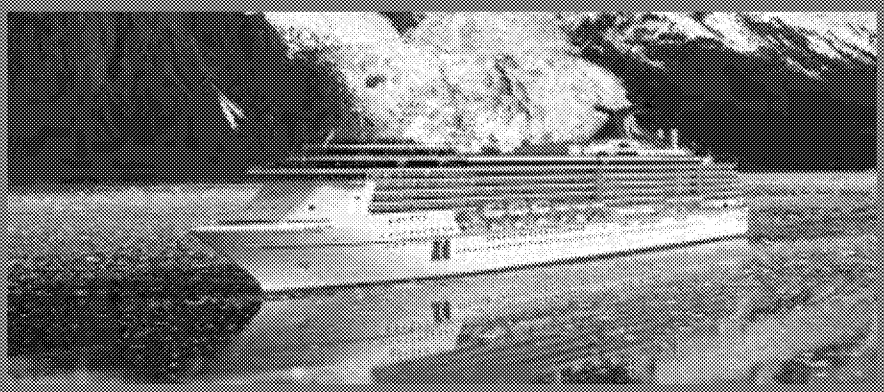
US EPA Administrative Order on Consent
Report required by Section V.B.1.

2018 Alaska Cruise Ship Sailing Season – Compliance Requirements

February 6, 2018



Section V.B. 2018 Alaska Cruise Ship Sailing Season – Compliance Requirements

"V.B.1. No later than January 30, 2018, Carnival shall submit a report to EPA, for each Covered Cruise Ship, to include:

a. ***A statement for each ship as to whether or not they will be able to comply with the 2013 VGP pH requirement (6.0 pH at discharge) during the 2018 season."***

Response for the following Covered Cruise Ships:

- *Carnival Legend*
- *Coral Princess*
- *Emerald Princess*
- *Golden Princess*
- *Grand Princess*
- *Island Princess*
- *HAL Oosterdam*
- *Ruby Princess*
- *Star Princess*
- *HAL Amsterdam*
- *HAL Eurodam*
- *Nieuw Amsterdam*
- *HAL Noordam*
- *HAL Volendam*
- *HAL Westerdam*
- *HAL Zaandam*

While in Alaskan VGP waters during the 2018 sailing season, the Covered Cruise ships should have the ability to comply with the 2013 VGP pH requirement (6.0 pH at discharge) or with the interim effluent limits set forth in Section V.A, with minor occasional exceedances as discussed below.

This is due to the technical and operational adjustments made to these ships as discussed in previous AOC reports through increased buffering water capacity, more efficient engine load management, and fuel sulfur contracts. These technical and operational adjustments were further expanded for the 2018 Alaska sailing season as noted in Item 1.c. below. To illustrate, depending on the vessel, we anticipate buffering water capacity increases from 800 m^3/hr to approximately 1100 m^3/hr to 1400 m^3/hr, an estimated 38% and 75% increase respectively.[1] Thus, with increased buffering we can meet the interim effluent limits with only occasional exceedances, which may still occur in areas of low seawater alkalinity (*e.g.*, vicinity of Skagway) or briefly on engine/EGCS startup if any pH sensor settling delay is experienced. Calibration checks of installed pH meters in service may also occasionally create a momentary (single record) shift to calibration fluid levels (4.0 or 7.0pH). We expect that the occasional

[1] We install greater buffering water capacity increases for ships with larger engines.

exceedances in 2018 will be fewer than in 2017 due to the adjustments mentioned plus lessons learned, increased experience, and the initiatives described in 1.c. below.

Perspective is also important – EGCS measurement records, including for pH, are created every three minutes, which amounts to each EGCS on each vessel producing 480 pH measurements per day. As all of these vessels have more than one EGCS, this commonly creates more than 1,000 pH measurements per day per ship, amounting to more than 2,000,000 pH measurements for the fleet during the Alaskan sailing season.

b. ***"A statement for each ship as to whether or not they will be able to comply with any EGCS discharge requirements for pH in any proposal for a VGP that will replace the 2013 VGP during the 2018 Sailing Season."***

Response for all Covered Cruise Ships:

At the time the AOC was signed, EPA expected to have published the proposed 2018 VGP for comment before this report was due. We now understand the proposed 2018 VGP will not be published for comment until April or May so this subsection is not applicable.

However, we wanted to highlight here the results of the Ambient Monitoring Tests ("AMT") contained in the *EGCS Wash Water Measurement Report* prepared by Lloyd's Register and submitted to EPA per the AOC. The primary intent of the AMT was to observe and measure the wash water pH within the water plume overboard at specified points.

With regard to IMO's MARPOL Annex VI requirements, Lloyd's Register found that the AMT results show that with wash water discharge pH in the test range of 4.0 to 6.3, the overboard pH at 4 meters from the ships' side were at or well above 6.5 pH, and in the range of ambient seawater pH (7.8-8.2pH), except in the isolated case of *Grand Princess* in Skagway on September 9, 2017, where one reading of 6.4 pH was obtained.[2] Lloyd's noted, however, that with after-buffer pH of 5.5 and below, all results at 4 meters were 7.0pH or above. These measurements suggest that the proposed 2018 VGP limit could be lowered to 5.5 pH since the testing indicates that a lower pH range will allow for the greatest opportunity for high compliance levels without adverse impact on the environment.

c. ***"A detailed description of the actions that Carnival will take during the 2018 sailing season to test options and make operational and other changes to comply with VGP requirements for EGCS pH no later than during the 2019 sailing season."***

Response for all Covered Cruise Ships, in preparation for the 2018 Sailing Season:

1) **Technical:** Carnival is implementing an Automation Software Upgrade that will allow EGCS start-up prior to engine start. This change in automation is intended to allow water analysis instruments to start settling into accurate reporting before engine startup and reduce potential sensor exceedances after engine start.

[2] We note this test was performed in adverse weather conditions and the methodology was not able to be validated by Lloyd's Register for that reason. Also, Skagway has the lowest natural seawater alkalinity of any of the three Alaskan ports where tests were conducted, and is 0.5pH units lower than Juneau.

2) **Technical:** Carnival is implementing an Automation Software Upgrade that will automatically alert crews to shift buffering water pumps to 100% as the ship approaches VGP waters, based on GPS position and ships' course and speed. This change in automation is intended to aid ship's staff in timely change of the buffering pump selections, thereby increasing accuracy and consistency.

3) **Technical:** Carnival is installing Salinity/Conductivity and Temperature Meters to the seawater inlets of all EGCS ships in Alaska in 2018.

4) **Operational:** Carnival is preparing an Onboard Monitoring Package to allow onboard EGCS data sharing in Neptune[3] format, which should proliferate EGCS operating parameter dashboards within the ship's data network and permit viewing outside the ECR in various locations to allow broader onboard awareness of the current EGCS compliance situation among watchstanders.

5) **Operational**: Carnival is developing a Fleet Operations Center Monitoring Package to allow EGCS parameter monitoring off-ship via an EGCS Dashboard. Carnival will have two Fleet Operations Centers operational in North America (Seattle and Miami) during the 2018 summer sailing season.

6) **Operational**: Carnival will conduct an EGCS Pre-Season Operations Campaign in Q1/Q2 of 2018 with an expanded onboard computer-based training (CBT) package and a pre-season calibration and equipment tune-up program. Carnival will also brief every ship on the latest best practices for compliance with pH, PAH, and turbidity requirements, including lessons learned in the 2017 Alaska sailing season.

Final Notes:

1. We note that the results of the washwater discharge pH testing conducted by boat on 11 ships (10 ships in 3 Alaska ports and 1 ship in Victoria, BC) at the end of the 2017 sailing season, discussed above and in detail in the Ambient Monitoring Report prepare pursuant to Section IV.D. of the AOC, is considered strong evidence of the negligible environmental effect from the pH of EGCS washwater.

2. Additionally, we note that the Review of the 2015 Guidelines for Exhaust Gas Cleaning Systems (Resolution MEPC. 259(68)) dated October 31, 2017 (PPR 5/11/1) addresses guidance on accidental breakdown, instrument malfunction, and perceived temporary non-compliance and transient performance of EGCS. This IMO document includes several recommendations on topics germane to this report on accidental breakdown, instrument malfunction, and perceived temporary non-compliance and transient performance of EGCS. For example, the proposed guidance in that document includes issues such as:

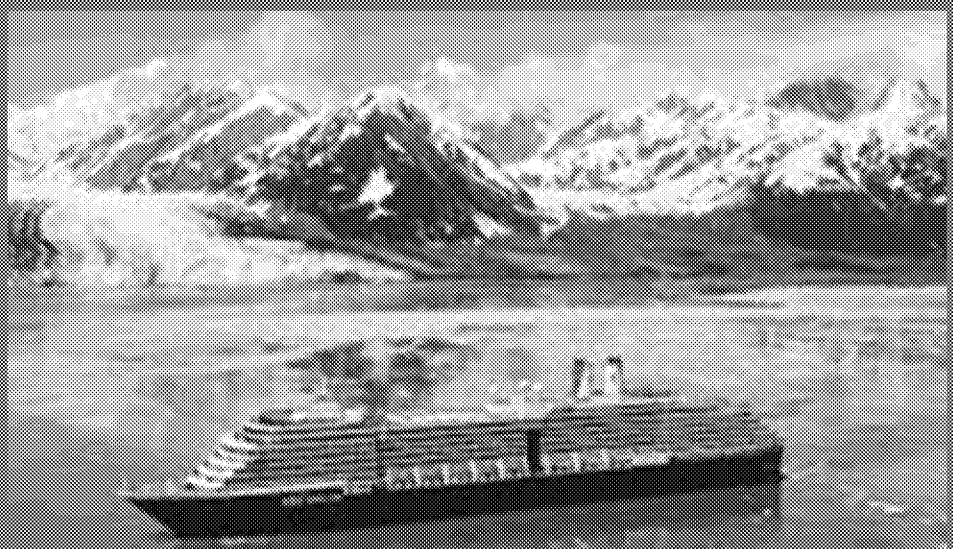
[3] Neptune is a platform for off-ship data monitoring and analytics which is used to collect onboard events from various shipboard systems.

- **Temporary malfunction of the monitoring system only, which does not interfere with the performance of the EGCS**:
    - "(9) When running on a fuel oil with a constant sulphur content, all parameters monitored according to the 2015 Guidelines for exhaust gas cleaning systems (resolution MEPC.259(68)) (i.e. emission ratio, washwater pH, etc.) will be in a certain interrelation, all depending on each other. If one of the parameters changes, some other(s) will necessarily also have to change. Scheme A certified EGCS depends on this interrelation between parameters since there is no requirement for continuous monitoring of the emission ratio.
    - (10) This interrelation also works as an indicator in case of instrumentation malfunction; i.e. if a single sensor signal starts to deviate or even falls out, the effect on the other parameters will tell whether the changes in signals are caused by sensor failure or if the EGCS itself shows a change in performance. If the other parameters are continuing at the normal levels, it is an indication that there is only an instrumentation malfunction, and there is no signal of non-compliance with regard to levels allowed in the exhaust gas emissions and the washwater discharge."
- **An EGCS suffers from transitory non-compliance**
    - "(11) During the start-up and shut-down of an EGCS or due to significant changes in engine load due to adverse weather and sea conditions, there may be a short period during which the measured emission ratio limit might indicate that the applicable limit has been exceeded. This is a common behaviour of monitoring equipment which does not necessarily mean exceedance of emissions and should therefore not be considered as a breach of the requirements unless the exceedances last for a sustained period."

3. The Review of the 2015 Guidelines For Exhaust Gas Cleaning Systems is scheduled for discussion during PPR 5 at IMO from February 5-9, 2018, and is expected to be ultimately referred to MEPC for final approval and entry into force for all ECA waters (outside U.S. VGP waters). We believe this EU proposal offers useful insight into practical EGCS operations and corroborates justification provided in the earlier AOC reports regarding instrumentation challenges. The IMO document is attached for your reference.

US EPA Administrative Order on Consent
Article IV.J.1

Review of Reports on Environmental Impacts



IV.J.1 Review of Reports on Environmental Impacts

"No later than December 1, 2017, Carnival shall submit to EPA a summary of existing reports that evaluate the impact of low pH discharges from EGCS to marine environments and aquatic species and whether those reports relate to Carnival's EGCS discharges in Alaskan waters. The Review of Reports on Environmental Impacts shall:

a. Identify and summarize any existing environmental assessments/studies on the use of EGCSs in Alaskan waters or elsewhere and the effect these have on the marine environment, including describing any differences between using low and high sulfur fuels. The summary shall describe the objectives, data collection and analysis, and conclusions of the report."

Study 1: Kjlholt, J., Aakre, S., Jurgensen, C., Lauridsen, J.: <u>Assessment of Possible Impacts of Scrubber Water Discharges on the Marine Environment</u>. (COWI 2012) Danish Environmental Protection Agency.

Summary: The Danish Environmental Protection Agency commissioned a study to assess the impact of scrubber water discharges on the marine environment. The study objectives consisted of: a literature review; a practical investigation; and a sampling campaign onboard the Ficaria Seaway to gather data from samples of EGCS discharge in both open and closed loop mode, collation and modeling of generated data to assess environmental impact, and a review of port reception facilities for sludge generated by closed loop EGCS.

The literature review examined different EGCS technologies, but focusing on "wet" scrubber types including: EGCS removal of SOx and particulate matter from marine exhaust, Exhaust Gas Recirculation (EGR), and Inert Gas Scrubbers (IGS). The primary discussion was narrowed to those EGCS designed to remove SOx from marine exhaust; this focus included both open and closed loop systems.

Removal rates of Sulfur up to 99% are documented by manufacturers, and varying rates of 60-90% for particulate matter.

The removal of particulate from the exhaust stream involves entrainment in the wash-water and includes metal oxides, sulfates, soot and other organic compounds. With EGCS that use seawater as the source for wash-water there is the potential for background levels of these parameters in the incoming seawater that do not represent additional pollution.

The practical investigation portion of the study included obtaining wash-water samples from the Ficaria Seaways, which utilizes a wet scrubber system manufactured by Alfa Laval and is able to operate in both open loop utilizing seawater and closed loop using freshwater in conjunction with chemicals to remove SOx from the exhaust gas stream, samples were obtained in both operating modes. The Ficaria Seaways is considered representative of a typical ship operating in the Baltic Sea ECA using EGCS.

The samples were obtained in 2011 during two separate sampling events while the ship transited between Gothenburg, Sweden and Immingham, UK. EGCS washwater samples were obtained while ship operated on two different engine loads (85-90%MCR and 40-45%MCR) and while using HFO with varying Sulfur content (2.2%S and 1.0%S).

Chemical analyses of the samples obtained during operation in the open loop mode using seawater for desulphurization indicate low levels of total nitrogen, implying a removal of NOx from the exhaust stream and detectable levels of total sulfur in the washwater after the scrubber. The increase in sulfur in the washwater is small compared to the high natural content of sulfate in seawater. Detectable levels of PAH were measured and estimated at 0.3-0.9 mg/kg fuel and exclusive of naphthalene at 0.1-0.6 mg/kg fuel. No correlation between fuel sulfur content or engine load and the resulting PAH levels in wash-water was demonstrated. Two metals (vanadium and nickel) with known presence in fuel (HFO) demonstrated a wash-water concentration as a function of sulfur content and engine load. In addition, the wash-water contained measurable levels of zinc and copper, the source of which could not be determined and was possibly due to sample contamination.

Marine impact assessment is based on the assumption that EGCS technology is used as an alternative to low sulfur fuel in the reduction of SOx emissions from marine exhaust.

The impact assessment utilizes modelling for two area types considered of import: the Kattegat Sea, open sea with high traffic and the Aarhus Bight: coastal area with limited seawater exchange and high traffic. In addition to the two location types three alternate scenarios were run: all ships equipped with EGCS and using 3.5%S fuel, one ship equipped with EGCS and finally a scenario with zero ships using EGCS.

Relevant parameters considered in the washwater discharge include sulfuric acid and sulfates, metals, and petroleum hydrocarbons inclusive of PAH. Not evaluated were NOx and CO_2, as both are not considerably reduced by EGCS. However, the Danish EPA indicated that removal of sulfur from fuel during refining and the associated energy consumption/CO_2 emissions could be higher than that required for EGCS operation.

The results from the washwater analysis from the Ficaria Seaways practical investigation were used as inputs for the dispersion modeling to assess environmental impact of metals, PAH, and hydrocarbon, with the exception of sulfur. Sulfur levels were valued using a worst case scenario of all ships using 3.5%S fuel and a 100% transfer of sulfur from exhaust to the washwater.

Environmental Quality Standards (EQS) applicable within the EU and standards specific to Danish territorial waters were used as a reference for assessing calculated environmental loading under all three scenarios. The sulfur and resulting sulfuric acid equivalent of the washwater was evaluated with consideration to the buffering capacity of the receiving waters.

With respect to the all ships scenario and the one ship (local impact) scenario: the resulting steady state surplus concentrations of metals, PAH and oil hydrocarbons "indicate that substances discharged with washwater are expected to occur in concentrations 3-6 orders of magnitude lower than the EQS and thereby far from ecological impact."

Also: "With regard to most of the hazardous substances the content of the fuel sulfur in the fuel oil and the content of the hazardous substances do not appear to be correlated". Vanadium, nickel, and sulfur are the exception and would on a local basis be the main difference between the ships with EGCS versus the "no scrubbers" scenario. This does not take into account the environmental impact of the refining process to reduce fuel sulfur.

An assessment of EGCS in seawater open loop mode in port determined that acidity and hazardous substances will not lead to violation of the EQS in the short term.

Using a worst case scenario of all ships equipped with EGCS and using 3.5%S fuel, calculated load input, sulfur as sulfuric acid, and assumptions based on the Kattegat and Aarhus Bight locations, the "contribution from EGCS to a possible general acidification of the oceans is considered marginal". This assumption and calculation is also applicable to areas such as the Bay of Bothnia, which has much lower alkalinity than the two study areas. In all scenarios, the buffering capacity of the receiving waters greatly exceeds, by orders of magnitude, the input of EGCS washwater.

Study 2: Hufnagl, M., Liebezeit, G., Behrends, B. 2005. Effects of Sea Water Scrubbing, Final Report to BP Marine Research. Research Centre, Terramare, Wilhelmshaven, Germany and School of Marine Science and Technology, University of Newcastle, Newcastle upon Tyne, UK. March 2005.

Summary: A study of the environmental impact of a seawater scrubber upon the harbors of Calais, France and Dover, UK., focusing on an analysis of the washwater discharge and its influence on the marine environment. The Pride of Kent, a channel ferry with an EcoSilencer EGCS system installed, was utilized for a series of five sampling campaigns. Samples were obtained from multiple locations within the EGCS and external seawater points within a 700 meter transect from the EGCS outfall. Environmental parameters including pH, salinity, oxygen, metals, and sulfate were measured and a series of tests to assess scrubber washwater impact upon the marine fauna were conducted. These included a quantitative survey of plankton, toxicity tests utilizing brine shrimp, and a PAH accumulation study of mussels.

pH was examined and measurements made to determine the buffering capacity of seawater; in addition, an evaluation was made of the time required for pH equilibrium to be reached after the addition of pH 4.0 acid. Samples from five locations (Jade Bay, Germany; Ems River, Germany; Odense Harbor, Denmark; Calais Harbor, France; and Dover Harbor, UK) were acidified to a pH of 4.0 and then mixed with corresponding untreated water in differing ratios. Time to reach equilibrium after the addition of acidified water to untreated water showed a dependence upon the amount of mixing and volume of mixture. Less volume and increased mixing decreased the time for pH to reach equilibrium. The resulting equilibrium pH values were the same for all samples. The values for the Ems River sample would be expected to vary from the seawater results; however, Hufnagl explains that the river has a high carbonate content, therefore a similar buffering capacity to seawater. Based upon these measurements Hugnagl states "it is possible to mix natural seawater with acidified seawater in a relation of 60:40 to give a pH change of 0.2 pH units. According to the EPA regulations 0.2 units is the maximum allowed pH change in the initial mixing zone."

To further assess the buffering capacity of seawater, pH was measured in situ, within 1-5M of the scrubber outlet and at distances of 50, 350, and 700 meters. No change in pH was observed in any of the measurements indicating that the seawater is capable of buffering low pH scrubber discharge.

A detailed survey of polycyclic aromatic hydrocarbons (PAH) included a method validation of GC-MS PAH analysis using solid phase extraction (SPE) preparation, identification of the PAH source to determine the contribution specific to EGCS washwater, and seasonal influences.

Determination of best method for the extraction of PAH in samples was based upon highest recovery rate and compared both liquid-liquid extraction (LLE) to SPE. Additionally, three different SPE sorbents were assessed using varying sample preparation and solvents. GC-MS method validation was based upon linearity and the integration of peak areas for accuracy as demonstrated using a series measurement with solutions of known concentration.

Results from the method validation indicated variability between SPE sorbents and solvent and preparation method, and Hufnagl determined that a combination using SPE C18ec cartridges and dichloro-methane as solvent yielded the highest recovery rate, additionally, LLE "also showed good recovery rates".

Water samples were collected at several steps throughout the scrubbing process, in the vicinity of the scrubber overboard outlet, and representative locations within the ports.

Results of the PAH analysis indicate that the EGCS process results in contribution of PAH to the washwater, with detectable levels of fluorene, phenanthrene, and pyrene dominating. However, measurements taken "directly in front of the outlet" showed no observable increase in PAH. Samples taken from within the harbor were evaluated to determine the source of detectable PAH and to exclude the EGCS as the source, using isomeric ratios. Hufnagl concludes that "With the linear regression and the principle component analyses it could be shown that the composition of the seawater scrubber samples was different from those observed in the harbours" and would indicate that other sources are contributing to the PAH levels measured.

Hufnagl determined a seasonal fluctuation in the PAH levels measured in the port locations and suggested that elevated levels of PAH found during colder temperature months could be due to surrounding populations using fuel combustion as a source of heat.

All measured results for nitrate and sulfate were consistent with and "well within the natural range". (Carnival note: we rarely, if ever, see any nitrates in samples).

Metals were assessed and found in detectable levels in samples taken from within the scrubber system, however only one overboard sample had a detectable amount, which was in the form of iron. In summation Hufnagl states "it can be said that no increase in metals concentration was observed outside the Pride of Kent" and further that "no negative effect is to be expected".

Additional tests regarding accumulation and toxicity did not indicate "an increased toxicity of the effluent, neither acute nor chronic."

In overall summation Hufnagl states "Close to the seawater outlet in the ambient waters no decrease in pH, no higher nitrate or sulphate values, and no increased PAH or metal contents were determined."

Study 3: EPA, 2011. Exhaust Gas Scrubber: Washwater Effluent (EPA-800-11-006) United States Environmental Protection Agency Office of Wastewater Management.

Summary: The Study characterizes the content of EGCS washwater, based upon available sampling data, and its effect upon water quality and the marine environment. The study provides an overview of the EGCS technology, IMO guidelines specific to EGCS, washwater sampling data from trials onboard the MS Zaandam, Pride of Kent, and the Suula, and a pollutant- specific assessment of EGCS washwater in relation to the protectiveness of IMO Guidelines.

Data from trials of three vessels installed with EGCS -- the Pride of Kent and the MS Zaandam equipped with seawater desulfurization units and the Suula with a closed freshwater scrubber -- were reviewed and assessed to determine the concentration of washwater discharges, including pH, temperature, turbidity, nutrients, metals and PAH.

Trials from the MS Zaandam indicate that the mean pH of the overboard washwater was 5.8, while in coastal waters of California and Hawaii. In Alaska coastal waters the mean increased to 6.3, however, this was made possible due operational changes, including raising the volume of the "reaction water" and by reducing engine loads. For samples collected in Alaska there were not any detectable levels of PAH, one sample obtained in Vancouver had a concentration of 1.3ppb phenanthrene equivalents.

Volatile organic compounds, benzene, toluene, ethylbenzene, xylene, and total petroleum hydrocarbons were not detected in any of the washwater discharge samples.

Washwater samples obtained at the EGCS intake and outlet were measured for metals. Levels of arsenic, copper, lead, nickel, and selenium in some of the samples obtained at both locations were above the EPA's National Recommended Water Quality Criteria for the protection of aquatic life for saltwater organisms (NRWQC). It is additionally noted that "the high concentrations of chloride and other cations on seawater were found to interfere with the analytical determination of arsenic, as well as selenium" possibly accounting for the elevated levels measured.

Trials on the Pride of Kent, over a 16 month period, assessed the environmental impact of EGCS use in the ports of Dover and Calais. Samples were taken at several points within the EGCS

system, locations throughout the ports and in the immediate vicinity of the EGCS point of discharge. Samples were collected during five unique sampling campaigns.

An elevation in temperature was observed between the inlet seawater and overboard discharge, and in the area adjacent to discharge.

Measurements of pH showed a decrease across the EGCS system, with lowest values recorded immediately after the scrubber towers. Upon addition of buffering water after the tower the pH increased, demonstrating the buffering capacity of the seawater. Samples taken throughout the harbor and in the area immediately in front of the scrubber discharge showed no change in ambient pH.

Samples analyzed for metals showed results that exceeded the NWQRC, however, of these samples "When exceedances were detected in the discharge, they were often also detected in the intake in similar or even higher concentrations, indicating that the ambient seawater was a likely source of the metal (Hunagl et al. 2015)".

Measureable levels of PAH were observed in samples taken from the EGCS system and were higher at the discharge than at the inlet. Phenanthrene was the predominant PAH detected, the concentration in the washwater prior to dilution was "six to ten times lower than the 50 µg/L IMO Guideline"; when compared to the NWQRC several samples were above the criterion.

Ambient samples collected did not show any impact upon PAH levels in the area adjacent to discharge or elsewhere in the ports.

A study of the closed loop freshwater EGCS installed on the Suula showed the system was capable of meeting the limits as established by the IMO Guidelines. Overboard discharge demonstrated measureable levels of PAH, hydrocarbons, and metals, however all were below IMO guidelines.

The data collected from the above mentioned trials was evaluated in comparison to water quality standards established in the NRWQC and the limits established by the IMO Guidelines. It is noted that the NRWQC is used as a conservative screening tool to assess the potential impact of washwater discharge upon overall water quality and that the "discharge concentrations greater than the applicable criterion do not necessarily indicate that a discharge poses a significant risk or would be likely to cause or contribute to a water quality standard exceedance".

Study 4: Behrends, B., Liebezeit, G. (2003). Reducing SOx and NOx Emissions from Ships by a Seawater Scrubber. Report, Research Centre Terramare, Wilhelmshaven, Germany. BP Marine Report.

Summary: An analysis of the impact of produced ions and low pH of washwater discharge from a seawater scrubber on the marine environment, utilizing calculated values based on the chemistry of neutralization of sulfuric acid in seawater, laboratory measurements and literature.

An initial calculation to assess the impact of adding sulfuric acid to seawater concluded that for every molecule of sulfuric acid introduced a shift in equilibrium of two molecules of CO_2 will occur. The calculation is simplified as it assumes ideal seawater composition and does not take into account all variables.

Laboratory measurements were carried out by Behrends to determine the buffering capacity of seawater to neutralize sulfuric acid.

Concentrated sulfuric acid diluted to pH of 4.0 with seawater was introduced into a sample of untreated seawater to mimic the effect of discharging EGCS washwater at worst case pH of 4.0 into the surrounding sea. The corresponding end concentrations showed that mixture of 1:10 (pH 4.0 sulfuric acid mix: untreated seawater) results in a pH shift of 0.1 and a similar dilution of 1:5 shifted the pH 0.23. A second, similar experiment was conducted using samples from brackish waters. Impact on initial pH was greater with a shift of 1 pH unit for a 1:10 dilution, however, within one hour the pH had returned to within 0.1pH of ambient.

With a dilution factor of 1:10 as measured by Berhends, a discharge of pH 4.0 would not change the pH of the receiving waters beyond 0.1pH Brackish waters demonstrated a greater change in pH with the introduction of sulfuric acid, however, within one hour had returned to with 0.1pH of ambient. The measurements were taken in a "closed system" and do not take into account the impact of ship movement, current, and other factors that would impact mixing.

The acidity of washwater discharge from an "Ecosilencer" EGCS was assessed using the results from the laboratory pH measurements. Different scenarios including fuel sulfur levels of 3.5, 1.5, and 0.5% were considered under operational conditions expected at sea versus in port. The discharged wash-water pH varied between 4.5-5.5, which would result in a pH change of less than 0.1 to surrounding waters based upon results of the laboratory measurements.

For comparison, a review of titanium oxide production and associated disposal at sea of concentrated sulfuric acid, 2.6pH in volumes reaching 750,000 tons per year, over a period of

twenty years, it was determined that the pH in the area of the disposal site "changed only slightly and were in the range of naturally occurring pH values" (Behrends, 2003).

Behrends concludes that the introduction of low pH (4.0) washwater is unlikely to cause a shift in pH beyond 0.1, this assuming a dilution of only 1:10. The impact upon receiving waters is further reduced by the additional mixing from ship movement, currents, and water exchange. This conclusion is based on full marine salinity.

Study 5: Nyman, G., and Tokerud, A., 1991. Seawater Scrubbing Removes SO_2 from Refinery Flue Gases. *Oil and Gas Journal,* July 1, 1991.

Summary: This is a determination and assessment of seawater effluent quality and environmental impact from a land based, seawater flue gas desulfurization (FGD) unit, installed at Statoil refinery, Mongstad, Norway.

Seawater is utilized to remove SOx from the flue gas of a fluid catalytic cracker unit. The system is a once-through process and spent seawater is returned directly to the sea without further treatment.

The low pH value water from the FGD was limited to a zone close to the discharge point and rapidly returned to ambient pH. Nyman states that the pH value of the discharge meets USEPA requirements for water quality standards for coastal waters exposed to industrial discharges, determined by delta pH of less than 0.2 at the boundary of the initial mixing zone.

The University of Bergen conducted a benthic survey and samples were analyzed from three locations situated in the immediate location of the scrubber discharge. Results indicate that there is no harmful impact to fauna located at locations adjacent to the scrubber outfall.

Nyman concludes that due to the alkalinity of the seawater pH is returned to with 0.2pH within the initial mixing zone and that there is no impact upon marine benthic population in location of scrubber discharge.

b. "Explain how, if at all, the information in the environmental assessments/studies identified pursuant to this Section relates to, provide insight, or can be analogized to the impact from the use of EGCS on Carnival's Covered Cruise Ships in Alaskan waters"

The use of EGCS will result in significantly improved emissions to the atmosphere primarily by the removal of SOx, NOx, and particulate matter during the seawater scrubbing process. Entrainment of these exhaust parameters within the resulting washwater will have negligible impact upon introduction into the receiving waters.

Reduction of SOx and NOx during the scrubbing process shortcuts or bypasses the cycle by where "most of the produced sulphate and nitrate will reach the oceans by surface runoff via the rivers" further Behrends contends "at land however the acidification of soils, lakes and rivers causes considerably higher damage." (Behrends 2003).

Removal rates of 99% for SO_2 and between 70-90% for particulate matter are documented and which would result in immediate positive local effects on human health, terrestrial acidification, and the formation of ozone precursors (Behrends 2003), (COWI 2012).

While it is demonstrated that the use of open loop EGCS is effective in improving the quality of the exhaust, the contents of the washwater are also of interest and there are limited studies available to assess the environmental impact of its discharge.

Published information and studies utilize data from a small number of ships using EGCS technology that could be considered as first generation and not fully reflective of the performance of today's improved systems.

With regard to parameters of concern, such as, metals, PAH, and oil hydrocarbons, the COWI 2012 study concludes that even with a scenario of all ships using EGCS that "substances discharged with washwater are expected to occur in concentrations orders of magnitude lower than environmental quality standards".

Hufnagl et al. observed enrichment of PAH, metals, nitrate and sulfate in the washwater, however samples taken directly in front of the overboard discharge and areas located within the harbor did not show any detectable elevation. Toxicity and accumulation tests utilizing bacteria, plankton and mussels, did not demonstrate any toxic effect (Hufnagl 2005).

A similar benthic survey undertaken at the Mongstad refinery showed that "no evidence of harmful impact on the marine bottom fauna at the seawater scrubber outlet was found" (Nyman 1991).

All studies indicate that the discharge of low pH washwater will be rapidly neutralized due to the buffering capacity of seawater and demonstrate that pH values as low as 4 will have only a transient effect. Hufnagl concludes "it is possible to mix natural seawater with acidified seawater in a relation of 60:40 to give a pH change of 0.2 pH units. According to EPA regulations 0.2 is maximum allowed pH change in the initial mixing zone" (Hufnagl 2005).

Assuming a scenario of 3.5% sulfur fuel and 100% transfer to washwater and the resulting depression of pH in the overboard discharge, with high ship traffic and low alkalinity receiving waters (e.g. Bay of Bothnia), the buffering capacity would be reduced by less than 0.1% (COWI 2012). Based on this assessment COWI concludes that impact of washwater discharges on buffering capacity and resultant pH "is assessed to be marginal".

Based upon results from laboratory investigations, dispersion modeling, direct measurements from samples taken adjacent to EGCS outfall, there is little to no impact on the pH of the receiving waters. This conclusion includes worst case scenarios using high sulfur fuels, assuming significant ship traffic and low alkalinity receiving waters.

Although there are not any studies specific to Alaska waters and the impact of EGCS, it can be assumed that results described in the available studies would apply. In summation, the use of EGCS by Carnival's Covered Cruise Ships in Alaska waters as well as in all other Vessel General Permit (VGP) waters would result in significant improvements in exhaust emissions and local air quality, while having negligible environmental impact from EGCS washwater to the receiving waters. The evidence shows that the buffering capacity of the seawater is sufficient to ensure that low pH discharge would not result in a change of greater than 0.2 within the initial mixing zone, consistent with EPA's guidelines on acid discharges.

c. "Analyze whether existing environmental assessments/studies provide any insight or information regarding any differences in environmental impacts between current Carnival practices for the discharge of EGCS washwater and any technologically feasible options identified in the Alternatives Report."

Considering the Alternatives:

a. **The use of low sulfur fuel** versus the use of high sulfur fuel in conjunction with an EGCS is evaluated in the "no scrubbers" versus "all ships with EGCS" scenario by the COWI study. Nickel and vanadium are the only parameters measured that show a direct correlation to fuel sulfur, therefore a switch to low sulfur fuel could result in a smaller contribution to the environment of these two metals. The use of high sulfur fuel would result in an additional discharge of sulfur versus low sulfur fuel, but "this amount is considered negligible" (COWI2012). As the "all ships" scenario is based upon "worst case" , it is surmised that under the more favorable, by comparison, normal operating conditions here is little or any benefit from switching to low sulfur fuel.
Note that this study did not take into consideration that the engines are designed, configured, and tuned for HFO use and therefore less efficient while using low sulfur fuel (MGO), creating potentially higher CO2 and PAH impacts. The environmental impact of additional refining of low sulfur fuel ("well to wake") was also not taken into account. We should also note that all Carnival ships operating in North American ports are using washwater filtration, which are shown by laboratory analyses to reduce the levels of residual metals discharged by half.

b. **Reducing engine loads** to reduce the exhaust volumes has not been an uncommon operational technique to help raise pH at discharge, but is limited by onboard minimum power requirements and the fact that ships are routinely already operating at minimum required loads. Where lower engine loads may be operationally possible to help achieve slightly higher pH at discharge (for a given washwater flow rate and buffering flow rate), the trade-off is usually the creation of additional exhaust emissions from less efficient lower engine loads. Lowering engine loads to raise pH at discharge in VGP areas has in the past very often led to the start of an additional engine to handle the ship's load, which usually means three engines at low efficiency loads instead of two engines at higher loads, with the resultant environmental air emissions penalty.

c. **Use of waste stream effluent from other ship operations**. This is not considered applicable.

d. **The use of closed loop systems** requires high volumes of toxic chemicals to achieve desulfurization, which also means accumulation onboard of low pH bleed off water and of sludge, which both require special handling and (for sludge) shoreside disposal. According to Behrends (2003), the benefit of open loop seawater scrubbing versus other desulfurization techniques includes: "no limestone (chemicals) need to be stored onboard, no waste is produced, which has to be deposited on land". In addition to the complexity, reliability, and onboard safety issues related to handling large volumes of toxic chemicals (caustic soda), we have concerns about the management of the low pH bleed water and the typical exhaust plumes associated with these systems. It should be noted that these systems are typically only operated in closed loop mode in port.

e. **Disposal at port**. Not discussed in the cited studies, but is not feasible for shore facilities and is a difficult logistics and technical (neutralizing and discharge) problem for such large barges as well.

f. **The increase of buffering water** flowrates to increase the pH of washwater before discharge does not result in any observable environmental benefit. As demonstrated in the studies by Tokerud, Behrends, and Hufnagl, in both laboratory and practical assessments, discharge with pH as low as 4.0 is readily neutralized by the receiving seawater and the environmental impact is negligible, therefore the additional energy consumption required to circulate increased buffering water onboard is not a preferred option.

g. **Use of neutralizing chemicals on the intake seawater or effluent**: Per the BP Marine Research study (Hufnagl 2005) the buffering capacity of seawater is sufficient to immediately neutralize washwater discharges and the addition of large volumes of chemicals is therefore unnecessary and undesirable.

Carnival summary: Although the published studies use data from a small number of ships with early EGCS technology, today we have more advanced systems and a significant data base of EGCS/exhaust gas tests, ship overboard discharge pH measurement trials, and over 250 EGCS washwater laboratory analyses from more than 50 ships with which to confirm and refine many study findings. Our extensive test experience is consistent with the existing literature and also supports the conclusion that for both seawater and air quality our open-loop EGC Systems, operating in ECA's with our washwater discharge policy of 5.0pH+, are the preferred and environmentally sound alternative.

Message

From: Rose, Cheryl [Rose.Cheryl@epa.gov]
Sent: 6/23/2017 6:27:14 PM
To: Thomas Dow Ex. 6 Personal Privacy (PP)
CC: Pollins, Mark [Pollins.Mark@epa.gov]; Michael Kaczmarek [mkaczmarek@carnival.com]; Faulk, Jack [Faulk.Jack@epa.gov]; Zobrist, Marcus [Zobrist.Marcus@epa.gov]
Subject: RE: Carnival Compliance Agreement - Friday Call - draft attached
Attachments: Carnival AOC proposal draft 6-23-17.docx

Tom,

Mark and I are available to talk at 3pm eastern. We think it is still worthwhile to touch base today to talk about where things are.

As you and I just discussed on the phone, attached is a rough first draft of the administrative order provisions. It is still being reviewed by some people here and may change, and it has some gaps, which are identified. So, it is very rough, but might be helpful to get your initial thoughts. I hope to have some of the issues more flushed out early next week. Also, this draft does not include the "boilerplate" provisions that go into orders, such as a summary of factual and legal background and statements about compliance with other laws and a description of Carnival. We will also be working to put that together for the next draft.

Talk to you shortly,

Cheryl

Cheryl T. Rose
Senior Attorney
Water Enforcement Division
Office of Civil Enforcement/OECA
202-564-4136

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-----Original Message-----
From: Thomas Dow Ex. 6 Personal Privacy (PP)
Sent: Thursday, June 22, 2017 10:48 PM
To: Rose, Cheryl <Rose.Cheryl@epa.gov>
Cc: Pollins, Mark <Pollins.Mark@epa.gov>; Michael Kaczmarek <mkaczmarek@carnival.com>; Faulk, Jack <Faulk.Jack@epa.gov>
Subject: Re: Carnival Compliance Agreement - Friday Call

Cheryl and Mark,
Are you available for the call at 3:00pm EDT? If so are you able to send a draft of the Agreement in advance?

If you are unable to make the call Friday, May we rescheduled for Monday? As we have discussed, we are eager to proceed and believe the proposal is beneficial.
Thanks and regards,

Tom Dow
Carnival Corporation

Sent from my iPad

> On Jun 21, 2017, at 7:45 AM, Rose, Cheryl <Rose.Cheryl@epa.gov> wrote:
>
> As Mark mentioned, he is unfortunately unavailable today and tomorrow. We are hoping that we will be able to send a draft to you by the end of the week. Would you like to meet on Friday or wait until early next week?
>
> Cheryl T. Rose
> Senior Attorney
> Water Enforcement Division
> Office of Civil Enforcement/OECA
> 202-564-4136
>

> This email may contain deliberative, attorney-client, attorney work product or otherwise privileged material. Do not release under FOIA without appropriate review. If this email has been received by you in error, you are instructed to delete it from your machine and all storage media whether electronic or hard copy.
>
> -----Original Message-----
> From: Pollins, Mark
> Sent: Wednesday, June 21, 2017 9:34 AM
> To: Thomas Dow Ex. 6 Personal Privacy (PP)
> Cc: Rose, Cheryl <Rose.Cheryl@epa.gov>; Michael Kaczmarek <mkaczmarek@carnival.com>; Faulk, Jack <Faulk.Jack@epa.gov>
> Subject: Re: Carnival Compliance Agreement - Wednesday Call
>
> Sorry but I will need to move the meeting. Other duties call this week. Cheryl will reschedule.
>
> Mark
>
> Sent from my iPhone
>
>> On Jun 21, 2017, at 9:17 AM, Thomas Dow Ex. 6 Personal Privacy (PP) wrote:
>>
>> Mark and Cheryl,
>> We look forward to the call tomorrow, 3:00pm EDT. Mike sent the invitation.
>>
>> Are you able to send an advance copy of the Agreement? We advised our execs and legal departments that we expect to have something to circulate after the call.
>>
>> Separately, we are holding Sunday, July 23rd for a ship tour in Baltimore.
>> Thanks,
>>
>> Tom Dow
>> Carnival Corporation
>>
>> Sent from my iPad
>>
>>> On Jun 14, 2017, at 9:51 AM, Pollins, Mark <Pollins.Mark@epa.gov> wrote:
>>>
>>> I know that's Cheryl's plan. She is diligently working on it.
>>>
>>> Sent from my iPhone
>>>
>>>> On Jun 14, 2017, at 12:10 PM, Thomas Dow Ex. 6 Personal Privacy (PP) wrote:
>>>>
>>>> Mark & Cheryl,
>>>> We would be grateful for a draft to review in advance of the next call.
>>>>
>>>> Is it possible to get something this week and schedule the call for next Wednesday?
>>>> Thanks,
>>>>
>>>> Tom Dow
>>>> Carnival Corporation
>>>>
>>>> Sent from my iPhone

US EPA Administrative Order on Consent
Article IV.G.3

2017 EGCS PH and Flowrate Report – Other Considerations

Part (1)

IV.G.3. 2017 EGCS pH and Flowrate Report – Other Considerations

"The 2017 EGCS pH and Flowrate Report shall include a section on other considerations. This section shall include:'

IV.G.3.a

"Exhaust Gas Composition – Provide a discussion in characteristics of exhaust emissions between using high sulfur fuel (with and without scrubbing) and low sulfur (0.1%) fuel."

Discussion: In comparing low sulfur fuel (MGO) to high sulfur fuel (HFO) and the effect of exhaust gas treatment by seawater scrubbing on exhaust components, SO_2, Particulate Matter (PM), particulate fractions PM_{10}, (sub 10 micron diameter), $PM_{2.5}$, (sub 2.5 micron diameter), particle number, Elemental Carbon (EC), and Organic Carbon (OC) will be the most dependent upon fuel sulfur content. CO_2, CO, and NOx emissions levels are similar between HFO and MGO, which indicates these parameters are independent from fuel sulfur content.

The use of an Exhaust Gas Cleaning system reduces the emissions of SO_2, PM, EC, OC, and visible smoke by using seawater to treat the exhaust gas, post combustion. Using seawater as a means of de-sulfurization has been used in land based applications for close to a century and its effectiveness in land applications is well proven. Water is one of the most efficient solvents found in nature and "seawater scrubbing" has a demonstrated positive impact on exhaust gas emissions over the broad range of operational conditions experienced onboard.

In addition to fuel sulfur content, the combustion efficiency and chemical composition of the fuel will also impact overall emissions. As HFO prior to combustion contains higher levels of metals, ashes, and sulfur than MGO, it could be concluded that MGO will produce less emissions than HFO if the emissions were based on content alone. However, due to differences in combustion efficiency a switch to low sulfur MGO versus HFO may not result in expected levels of emission improvement: diesel engine components are selected and timing is set in order to optimize efficiency and to limit emissions with HFO as fuel.

Combustion efficiency while operating on MGO is negatively impacted by the following:

- Improper Timing
- Low efficiency Injection components
- Incorrect injection viscosity
- Incorrect combustion Air/Fuel ratio

Carnival has committed to conducting a series of emissions studies, in cooperation with US EPA, on a number of ships equipped with Exhaust Gas Cleaning Systems (EGCS). The ships participating will represent all engine types currently active in the Carnival fleet. The goal of these studies is to expand the limited information available today regarding the relative emissions profile of the HFO/EGCS combination compared to MGO, as well as the contributions of "dry filters" (catalytic oxidation reactors) and other emissions reductions techniques used separately or in combination with EGCS.

Published peer-reviewed studies treating the topic of exhaust emissions reductions by seawater scrubbing are limited and show varying results, reflecting the inherent challenges in achieving accurate measurements in the post-EGCS operating environment.

The following summarizes findings from the limited number of published papers as well as two Carnival studies on ships with operational EGCS; the results indicate that operating with high sulfur fuel and EGCS is equivalent to low sulfur fuel and presents some evidence of exhaust emissions benefits over MGO.

SO2 emissions:

The removal of SO2 from exhaust via seawater scrubbing is a function of the buffering capacity of seawater and is dependent upon the dissolution of SO2 into seawater. The removal efficiency rate of SO2 by seawater scrubbing is well documented as greater than 90% and levels as high as 99% are consistently achievable.[4] Carnival's experience across 64 ships routinely operating EGCS is that exhaust SO2 emissions from ships operating high sulfur fuel in conjunction with Exhaust Gas Cleaning Systems are consistently lower than the mandated .1% sulfur content equivalent MGO. Typical values observed onboard Carnival Corp. ships during operation with HFO plus EGCS are the equivalent of .06% sulfur fuel, well below the required 0.1%S, and lower levels down to zero are considered easily achievable . Significant decreases of SO2 after the EGCS are well documented onboard and supported in literature with levels corresponding to the equivalent of fuel containing .03% S or less cited in a study by, Fridell 2014.[2]

Particulate Matter (PM) emissions:

Particulate matter is directly proportional to fuel sulfur content and influenced by engine load and other combustion efficiency factors. This correlation between fuel sulfur and particulate emissions is summarized in literature as an average of .33 g/kWh for MGO and 1.34 g/kWh for HFO. Particulate matter by mass reduction of 75% has been demonstrated in a study by Winnes and Fridell (2009), using EGCS as an abatement option with high sulfur fuel, the equivalent of switching from 2-3% S HFO to 0.1 S MGO.[1] Published values state a 25 to 98% reduction in PM emissions by mass may be realized by the use of EGCS. The variability in published PM values reflects the challenges associated with reliably measuring particulate after the EGCS, but there is general consensus that a shift to low sulfur fuel does not necessarily result in a reduction of the smallest diameter particles in comparison to high sulfur fuel. Instead, the limited data indicates that MGO contains a greater amount of submicron particles than HFO with EGCS.[1,2,5,6]

Tests conducted by Wartsila Technical Services onboard the M/V Crown Princess (with common rail engines) per ISO 8178 protocols demonstrated particulate emissions from HFO with a 2.32% S content in the range of 0 .81 g/kWh to 0.61 g/kWh prior to exhaust gas treatment by seawater scrubbing. Exhaust particulate measurements taken after the EGCS ranged from 0.70 g/kWh to 0 .61 g/kWh, corresponding to a removal efficiency for particulate of 27 to 59% dependent upon test cycle, per ISO 8178 methodology.[5] Elemental Carbon and Organic Carbon exhaust emissions before and after exhaust gas treatment were evaluated and demonstrated a reduction of Organic Carbon ranging from 39 to 72% dependent upon load and a reduction in Elemental Carbon ranging from 19 to 42%.[5]

Table 1: Comparison of Particulate Emissions HFO and HFO+EGCS, Crown Princess

Parameter	HFO	HFO EGCS	HFO	HFO EGCS	HFO	HFO EGCS	HFO	HFO EGCS	Units
Engine Load	30	30	50	50	70	70	85	85	%
PM Quartz Filter	.61	.28	.68	.28	.76	.43	.81	.55	g/kWh
PM Teflon Filter	.66	.38	.69	.41	.76	.50	.79	.58	g/kWh
Organic Carbon	.16	.079	.10	.058	.074	.041	.053	.032	g/kWh
Elemental Carbon	.052	.04	.028	.023	.029	.019	.025	.014	g/kWh

A second series of tests on M/V Costa Fascinosa were conducted by Cetena S.p.a. following EN 13284 (consistent with EPA Method 5 combined with modified EPA method 202) at a typical DG port load of 58%.[6] The tests included a direct comparison of the emissions of MGO to HFO, MGO to HFO plus EGCS scrubbing, and HFO exhaust pre and post EGCS. Concentrations of particulate at the primary filters were 40% less for MGO than for untreated HFO exhaust, 17.75 mg/Nm^3, MGO versus 21.43 mg/Nm^3, HFO. The reverse was documented at the secondary filters, MGO averaged particle mass of 49.71 mg/Nm^3 versus HFO with an average particle mass of 2.06 mg/Nm^3 a 96% greater mass of particulate for MGO. Comparing MGO to HFO plus EGCS a reduction in particulate mass of 74% HFO/EGCS over MGO was observed, 17.75 mg/Nm^3 for MGO and 4.63 mg/Nm^3 for HFO with EGCS. A similar result was observed at the secondary filters MGO emissions of 49.71 mg/Nm^3 and HFO with EGCS emissions of 11.15 mg/Nm^3. In addition to total particulate mass, fractions of $PM_{2.5}$ and PM_{10} were assessed for MGO, HFO, and HFO plus EGCS. MGO PM_{10} at the primary filter of 1.76 mg/Nm^3 was 5% less than for HFO and HFO plus EGCS showed a 6% lower value than MGO at 1.66 mg/Nm^3. $PM_{2.5}$ values for HFO with untreated exhaust were higher than for MGO, a 227% increase. In contrast after exhaust gas treatment the levels of $PM_{2.5}$ in the treated HFO were 12% lower than MGO, 1.32 mg/Nm^3 and 1.16 mg/Nm.[3,6]

Table 2: Comparison of Particulate Emissions MGO, HFO, and HFO+EGCS, Costa Fascinosa

Parameter	MGO	HFO	HFO+EGCS	Unit
Particulate at Primary Filter	17.75	21.43	4.63	mg/Nm^3
Particulate at Secondary Filter	49.71	2.06	11.15	mg/Nm^3
PM_{10} Primary Filter	1.76	1.84	1.66	mg/Nm^3
$PM_{2.5}$ Primary Filter	1.32	4.31	1.16	mg/Nm^3

Reference:

1. Winnes, H., Fridell, E., 2009. Particle emissions from ships: dependence on fuel type. J. Air Waste Manage. Assoc. 59 (12), 1391–1398.
2. Fridell , E., Salo, K., 2014. Measurement of Abatement of Particle and Exhaust Gases in a Marine Scrubber. J. Engineering for the Maritime Environment 2016, Vol. 230 (I) 154-162.
3. Lack, D.A., Corbett, J.J., 2012. Black carbon from ships: a review of the effects of ship speed, fuel quality and exhaust gas scrubbing. Atmos. Chem. Phys. 12 (9), 3985–4000
4. Bluefield (2013), Evaluation of the Emissions Reduction Performance of a Hamworthy/Krystallon Exhaust Gas Cleaning Scrubber, Final Report MV APL England, May 2013
5. Wartsila, 2017. Emissions Measure Report Crown Princess.
6. Cazzola D., De Angelis, E., 2017. Cetena Report Costa Fascinosa Exhaust Gas Measurements.

IV.G.3.b

"Fuel Composition – In addition to sulfur content, provide Bunker Delivery Notes and any other information in Carnival's possession on the composition of the different fuels that Carnival uses, including the full range of metals, PAHs, and other pollutants."

Bunker Delivery Notes (BDN) and laboratory analysis documents are provided separately in electronic form due to file size. Primarily represented in the BDN are the ships that participated in "Ambient Monitoring" as referenced in section IV.2.D. Also provided separately are summarized data including fuel composition, metals analysis, PAH and other parameters typically included in the BDN and associated laboratory analyses; this data is from the Carnival ships identified in section I.J and operating in Alaska for the 2017 season.

Carnival Costa P&O P&O CRUISES PRINCESS CRUISES

Holland America Line AIDA CUNARD SEABOURN Fathom

Ambient water quality monitoring project in Southeast Alaska's Inside Passage and the Gulf of Alaska during the 2018 cruise season

Axiom and Carnival Corporation

CARNIVAL CORPORATION & P.L.C.

Carnival Corporation & plc, ("Carnival") conducted an ambient water quality monitoring project in Southeast Alaska's Inside Passage and the Gulf of Alaska during the 2018 cruise season. Carnival retained Axiom Data Science ("Axiom") in Anchorage, Alaska for data ingestion, visualization, and submission to the Alaska Department of Environmental Conservation (ADEC) and the U.S. Environmental Protection Agency (EPA).

This is the SEP from the AOC of 28 Aug 2017, and it shows the data gathering activities of 15 ships in Alaska from April – October 2018.

INTRODUCTION

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Ship participation during the season included 15 vessels

	Operating Line	Ship
1.	Holland America Line	Amsterdam
2.	Carnival Cruise Line	Carnival Legend
3.	Princess Cruises	Coral Princess
4.	Princess Cruises	Emerald Princess
5.	Holland America Line	Eurodam
6.	Princess Cruises	Golden Princess
7.	Princess Cruises	Grand Princess
8.	Princess Cruises	Island Princess
9.	Holland America Line	Nieuw Amsterdam
10.	Holland America Line	Noordam
11.	Princess Cruises	Ruby Princess
12.	Princess Cruises	Star Princess
13.	Holland America Line	Volendam
14.	Holland America Line	Westerdam
15.	Holland America Line	Zaandam

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Project Task 1

Task 1: For 15 ships scheduled for Alaska operations in 2018, deploy, calibrate and maintain the onboard sensors for collecting seawater data, and create the data system infrastructure for real-time collection, storage, and transfer of the seawater data to ADEC.

Actions:

- Carnival installed four types of seawater sensors at the seachest inlet on 15 ships and sent technician teams to calibrate the instruments at the beginning of the Alaska season for each ship.
- Simultaneously, Carnival established the process to create a real-time flow of data from each ship via satellite connection to a Cloud account, and organized a weekly data transfer to a secure FTP site hosted by Axiom Systems. All data was formatted as CSV, and included location, time, ship identifier, parameter and parameter flag. Parameter flags were defined in accordance with QARTOD standards.

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Data file example

ship_name	time_utc	latitude	longitude	water_rack1_at_sw_inlet_ph	water_rack1_at_sw_inlet_ph_flag	sea_water_inlet_temperature_c	sea_water_inlet_temperature_c_flag	water_rack1_sw_inlet_turbidity_fnu	water_rack1_sw_inlet_turbidity_fnu_flag	conductivity	conductivity_flag	at_least_one_egr_on	in_eca	in_egp		
Island Princess	8/25/18 6:39	58.1462	-135.242	8.2	1	22	3	0.3	1	39.94	1	1	1	1		
Island Princess	8/25/18 6:42	58.1418	-135.224	8.2	1	22	3	0.4	1	39.87	1	1	1	1		
Island Princess	8/25/18 6:45	58.1375	-135.207	8.2	1	22	3	0.5	1	39.75	1	1	1	1		
Island Princess	8/25/18 6:48	58.1331	-135.19	8.2	1	22	3	0.4	1	39.69	1	1	1	1		
Island Princess	8/25/18 6:51	58.1288	-135.173	8.2	1	22	3	0.5	1	39.63	1	1	1	1		
Island Princess	8/25/18 6:54	58.1244	-135.155	8.2	1	22	3	0.4	1	39.64	1	1	1	1		
Island Princess	8/25/18 6:57	58.1201	-135.138	8.2	1	22	3	0.5	1	39.71	1	1	1	1		
Island Princess	8/25/18 7:00	58.1159	-135.121	8.2	1	22	3	0.4	1	39.79	1	1	1	1		

Flag Legenda:

1: data reasonable:	values on the expected range	(inside UserRange)
3: data suspected:	values are slightly outside the expected range	(inside SensorRange, but strange values)
4: data error:	values completely outside the expected range	(Outside SensorRange)

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Project Task 2

Task 2. Connect real-time data streams to a data portal for weekly summaries and visualization of water quality criteria.

Actions: Upon the weekly upload to Axiom's FTP server, data was processed in three parallel efforts.

- CSV data was reformatted to match the template provided by Alaska Department of Environmental Conservation (ADEC). Formatting was governed by Gold Systems, the data management team for the Ambient Water Quality Monitoring System (AWQMS) program, ADEC. At ADEC's request, data was submitted without quality control flags; ADEC applies internally-defined parameter limits.
- CSV data was converted to netCDF format via Jupyter Notebook (python) script. Vessel observations were resampled at 30-minute intervals (from the original 3 minute interval) to limit file size for transfer to a web-based interactive map ("portal"). NetCDF files were used to populate a postgres database, which was made available as a url endpoint for the web portal. Only "Pass" data was passed to the interactive portal. The portal is available at https://carnival.axds.co/#map
- Beginning mid-season, Axiom provided a weekly quality control report to Carnival. Quality flags for each sensor, each ship, were plotted as a timeseries to aid in Carnival's quality assessment.

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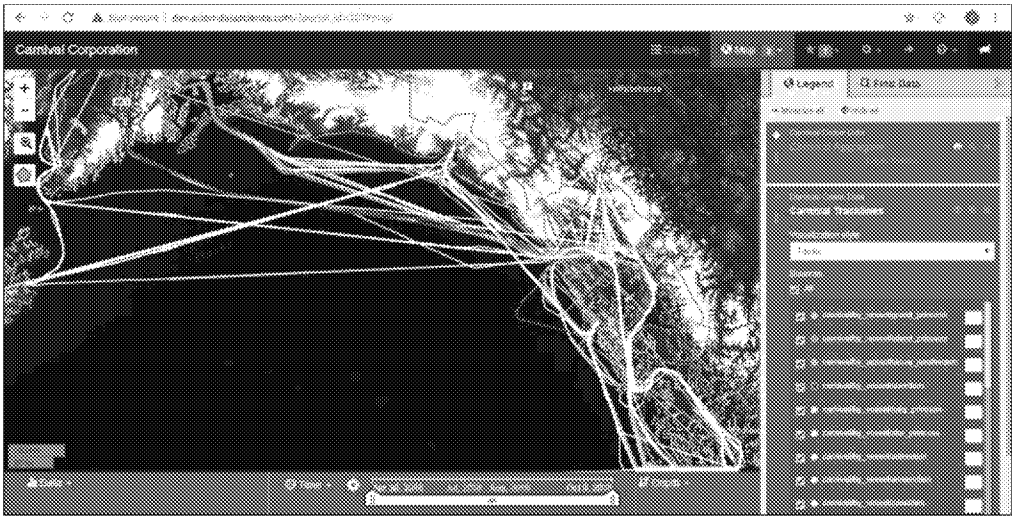
Carnival Data Portal showing Carnival 2018 ship tracks

https://carnival.axds.co/#map



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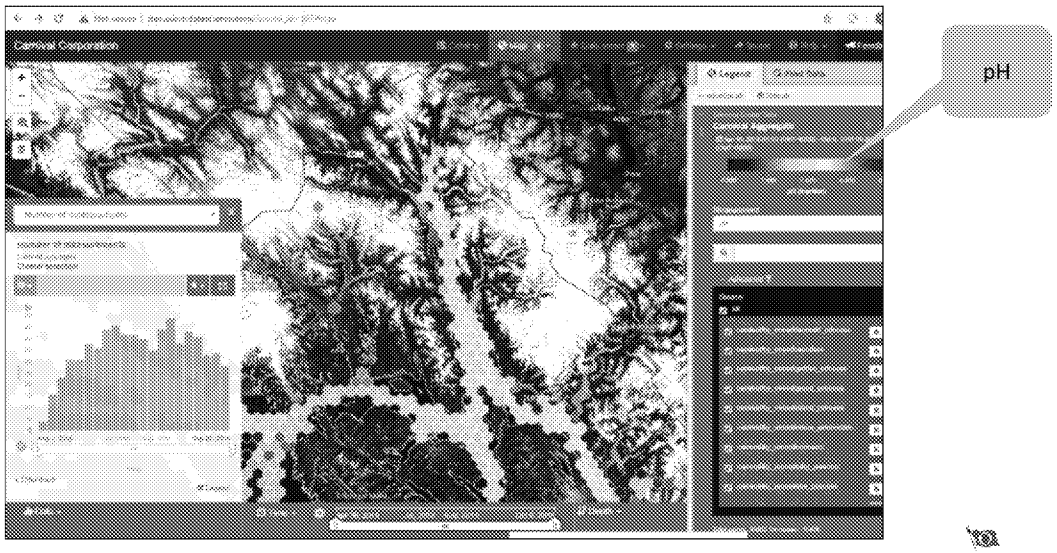
Juneau to Skagway pH measurements and observation summary



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Lynn Canal pH measurements May to September 2018

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Skagway Piers and pH trend May to September 2018

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Task 2 data description

- Sensor measurements were reported from April to October, 2018.
- Compiled data includes 583,830 observation events, each with up to 4 sensor measurements, totaling 76 MB of data (CSV).
- 64% if these observations were made with at least one exhaust gas cleaning system on, which means fresh moving water was used , totaling 376,121 observations. These are the only observations passed by Axiom to ADEC database.
- CSV files were converted to self-descriptive netCDF files following the Feature Type: *trajectory* conventions provided by NOAA's National Centers for Environmental Information (NCEI).

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Project Tasks 3,4 and 5

Task 3. Routinely monitor real-time data feeds and weekly summaries to ensure data system health.

Action: Weekly communication between Carnival and Axiom Data Science ensured that all systems were operational and that suspect data was identified and relayed to Carnival for equipment monitoring.

Task 4. Preparation of a final report to be provided to ADEC and EPA at the end of the 2018 cruise season.

Task 5. Securely store all data during the life of the project and beyond.

Action: In addition to the ADEC data storage, Carnival data are stored on Axiom's redundant server bank in both CSV and netCDF formats and also stored in Carnival Database (Neptune)

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Project deliverables

This project has generated **four main products**:

1. **A database containing seawater data** collected from Carnival's real-time data reported by 15 ships in Alaska waters during the 2018 cruise season.

2. **Data submission to ADEC**, via formatting by Axiom.

3. **A web-based interface** (the "Carnival data portal") hosted on Axiom's infrastructure and connected to the sensor database that displays weekly summaries and heat map visualization of seawater qualities for access by Carnival and ADEC personnel. The portal is linked to performance monitoring systems to ensure the health of the data system.

- The Carnival data portal is a modern HTML5 platform for data visualization, exploration, and download (Ref. Following slides). The portal features an intuitive interface to select from the various ships and measurement parameters, with the addition of "Number of measurements." Data is dynamically binned into hexagons at low zoom, and reverts to the 30-minute mean observations at high zoom. Hexagons or user-defined polygons can be created to view timeseries plots.

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Four parameters were measured

- conductivity
- temperature
- pH
- Turbidity*

*Conductivity was converted to salinity at the request of ADEC following the guidelines of TEOS-10, and using the calibration temperature of 25 °C. The salinity conversion was conducted by Axiom before delivery the data to ADEC.

Examples of each parameter follows:

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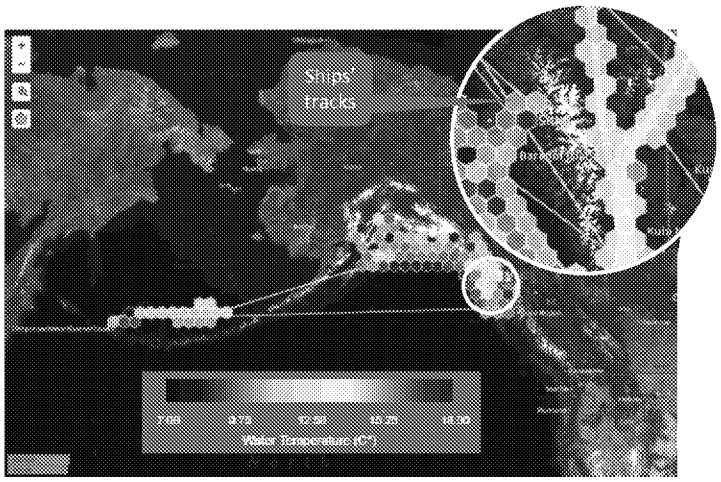
Sea Water temperature measured at seawater inlet

General Overview of data collected from Carnival Ships operating in Alaska in 2018



- Considered span of time from April 30th 2018 to October 9th
- 30982 collected points, one record every 3 minutes
- Polygons showing aggregation of temperature data collected by Carnival Ships operating in the region measured at Seawater inlet (Rack 1)
- Color code indicating as per described legend average pH for the considered span of time
- Lines show ships track

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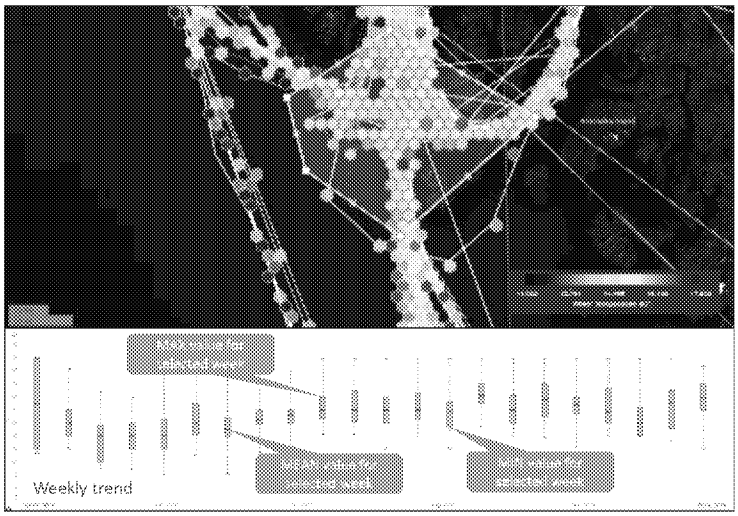
Sea Water Temperature (Deg C) measured at seawater inlet

Example: Analysis of a specific region



- Defining a **subset of data set described by the yellow polygon** is possible to provide details of minimum, maximum and mean value for defined span of time.
- For Summer Season 2018 in the identified subset area sea water temperature values are:
  - Min 11 Deg C
  - Max 18 Deg C
  - Mean 14 Deg C
- Enclosed trend shows weekly variations highlighting seasonality.

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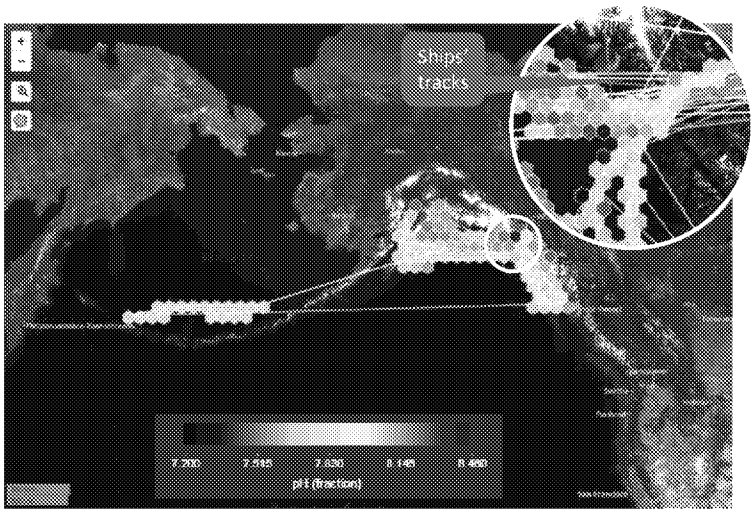
Sea Water pH measured at seawater inlet

General Overview of data collected from Carnival Ships operating in Alaska in 2018

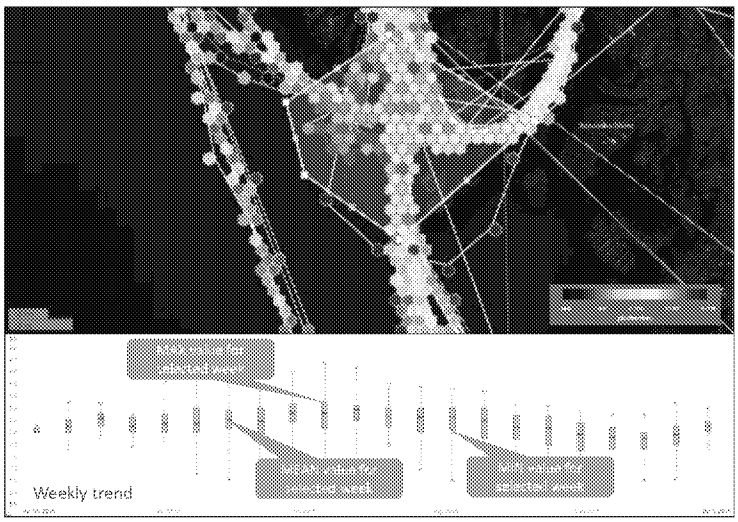


- Considered span of time from April 30th 2018 to October 9th
- 30982 collected points, one record every 3 minutes
- Polygons showing aggregation of pH data collected by Carnival Ships operating in the region measured at Seawater inlet (Rack 1)
- Color code indicating as per described legend average pH for the considered span of time
- Lines show ships track

CARNIVAL CORPORATION & PLC

Sea Water pH measured at seawater inlet

Example: Analysis of a specific region

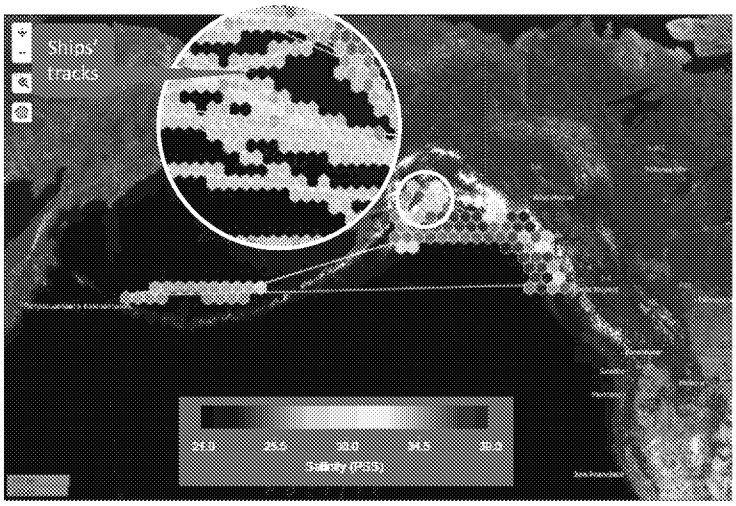


- Defining a **subset of data set described by the yellow polygon** is possible to provide details of minimum, maximum and mean value for defined span of time.
- For Summer Season 2018 in the identified subset area sea water pH values are:
  - Min 7 pH
  - Max 8.95 pH
  - Mean 7.94pH
- Enclosed trend shows weekly variations highlighting seasonality

CARNIVAL CORPORATION&PLC

Sea Water Salinity (PPS) measured at seawater inlet

General Overview of data collected from Carnival Ships operating in Alaska in 2018

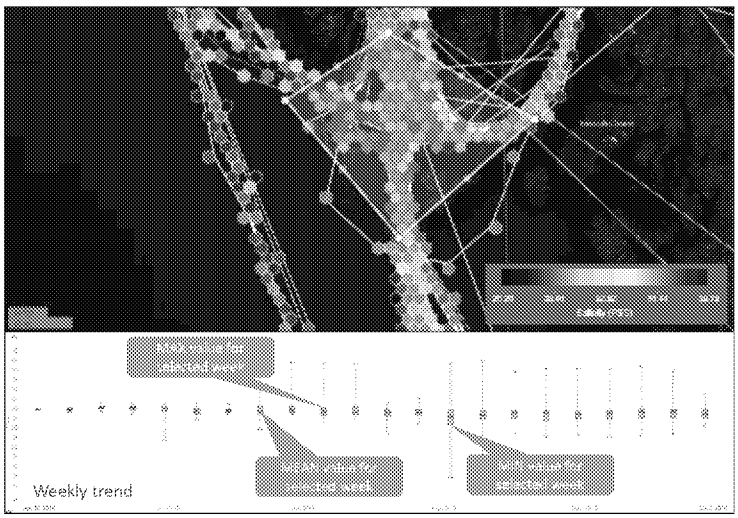


- Considered span of time from April 30th 2018 to October 9th
- 30982 collected points, one record every 3 minutes
- Polygons showing aggregation of Salinity (PPS) data collected by Carnival Ships operating in the region measured at seawater inlet (Rack 1)
- Color code indicating as per described legend average pH for the considered span of time
- Lines show ships tracks

CARNIVAL CORPORATION & PLC

Sea Water Salinity (PPS) measured at seawater inlet

Example: Analysis of a specific region

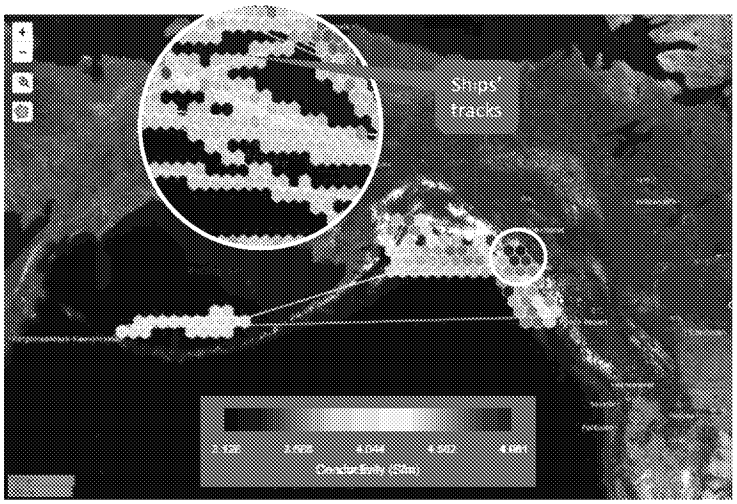


- Defining a **subset of data set described by the yellow polygon** is possible to provide details of minimum, maximum and mean value for defined span of time.
- For Summer Season 2018 in the identified subset area sea water Salinity (PPS) values are:
  - Min 16 PPS
  - Max 40 PPS
  - Mean 28 PPS
- Enclosed trend shows weekly variations highlighting seasonality

CARNIVAL CORPORATION&PLC

Sea Water Conductivity (S/m) measured at seawater inlet

General Overview of data collected from Carnival Ships operating in Alaska in 2018

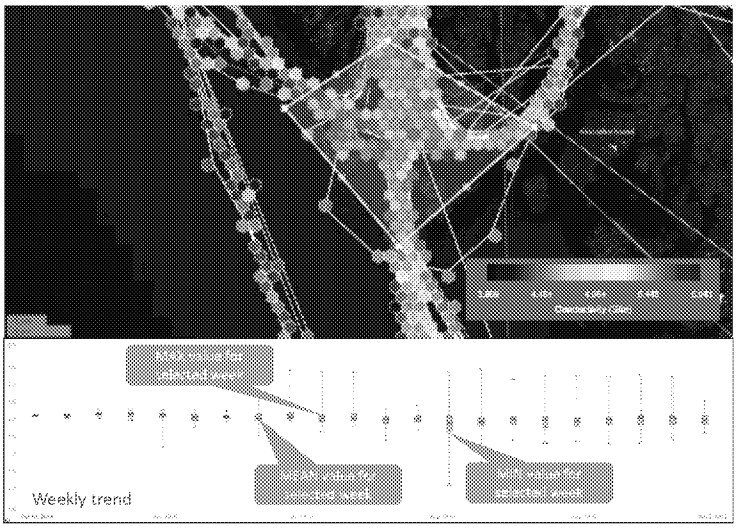


- Considered span of time from April 30th 2018 to October 9th
- 30982 collected points, one record every 3 minutes
- Polygons showing aggregation of Conductivity (S/m) data collected by Carnival ships operating in the region measured at seawater inlet (Rack 1)
- Color code indicating as per described legend average pH for the considered span of time
- Lines show ships track

CARNIVAL CORPORATION & PLC

Sea Water Conductivity measured at seawater inlet

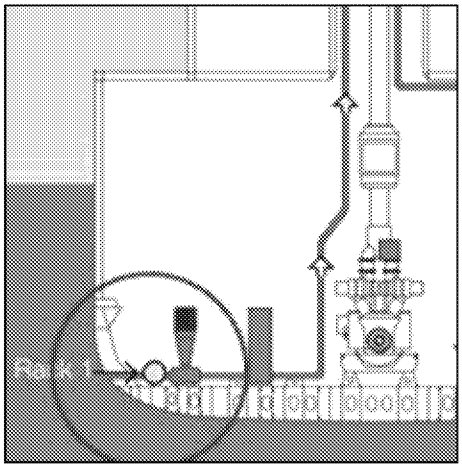
Example: Analysis of a specific region



- Defining a **subset of data set described by the yellow polygon** is possible to provide details of minimum, maximum and mean value for defined span of time.
- For Summer Season 2018 in the identified subset area sea water Conductivity (S/m) values are:
  - Min 2.560 PPS
  - Max 5.979 PPS
  - Mean 4.522 S/m
- Enclosed trend shows weekly variations highlighting seasonality

CARNIVAL CORPORATION&PLC

Final considerations



- **Temperatures.** Four parameters were measured at Rack 1 (see picture on the left) which is normally positioned in engine room spaces. However, depending on location of Rack 1, we noticed that on some ships seawater temperatures can be affected by the ship's internal temperature.
- To avoid this, for the 2019 Alaska Season we will use seawater temperature from the seachest on those ships with an extended distance between seachest and Rack 1.

- **Opportunities**. The four parameters are also continuously measured and stored in the Carnival Database during ship transits outside Alaska, offering the possibility to extend mapping of seawater conductivity, temperature, pH and turbidity to other geographical areas.

CARNIVAL CORPORATION & PLC

Ambient Water Quality Monitoring Project in Southeast Alaska's Inside Passage and the Gulf of Alaska During the 2018 Cruise Season

Report Prepared for Carnival Corp by Axiom Data Science

CARNIVAL CORPORATION & PLC.

Introduction

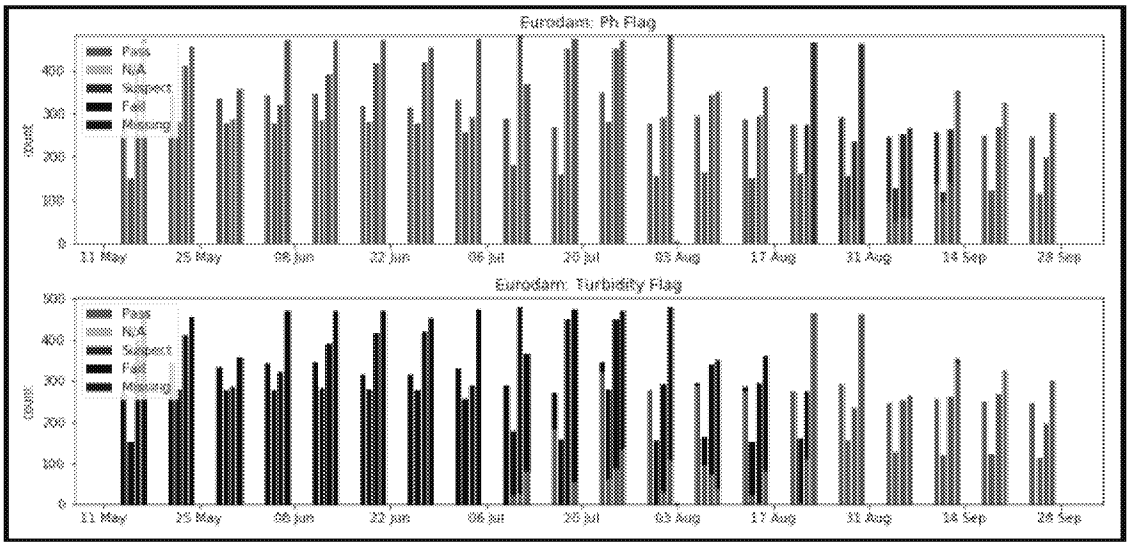
Carnival Corporation & plc, ("Carnival") conducted an ambient water quality monitoring project in Southeast Alaska's Inside Passage and the Gulf of Alaska during the 2018 cruise season. Carnival funded Axiom Data Science ("Axiom") for data ingestion, visualization, and submission to the Alaska Department of Environmental Conservation ("ADEC") and the U.S. Environmental Protection Agency (EPA).

Project Tasks

Task 1. Deployed and maintained data system infrastructure for real-time ingestion of water quality data. Carnival uploaded weekly data to a secure FTP site hosted by Axiom. Data was formatted as CSV, and included location, time, ship identifier, parameter and parameter flag. Parameter flags were defined in accordance with [HYPERLINK "https://ioos.noaa.gov/project/qartod/" \h] standards.

Task 2. Connect real-time data streams to a data portal for weekly summaries and visualization of water quality criteria. Upon the weekly upload to Axiom's FTP server, data was processed in three parallel efforts.

1) CSV data was reformatted to match the template provided by Alaska Department of Environmental Conservation (ADEC). Formatting was governed by Gold Systems, the data management team for the Ambient Water Quality Monitoring System (AWQMS) program, ADEC. At ADEC's request, data was submitted without quality control flags; ADEC applies internally-defined parameter limits.
2) CSV data was converted to netCDF format via Jupyter Notebook (python) script. Vessel observations were resampled at 30-minute intervals (from the original 3 minute interval) to limit file size for transfer to a web-based interactive map ("portal"). NetCDF files were used to populate a postgres database, which was made available as a url endpoint for the web portal. Only "Pass" data was passed to the interactive portal. The portal is available at https://carnival.axds.co/#map
3) Beginning mid-season, Axiom provided a weekly quality control report to Carnival. Quality flags for each sensor, each ship, were plotted as a timeseries to aid in Carnival's quality assessment. Refer to Figure (1).



Data quality time series. Vertical bars represent the number of daily observations, colors represent the QARTOD quality flags: Pass, N/A, Suspect, Fail, Missing.

Task 2. Data description.

Sensor measurements were reported from May 13th to September 19th, 2018. Compiled data includes 583,830 observation events, each with up to 4 sensor measurements, totalling 76 MB of data (CSV). 64% if these observations were made with at least one EGC on (moving water), totalling 376,121 observations. CSV files were converted to self-descriptive netCDF files following the [HYPERLINK "https://www.nodc.noaa.gov/data/formats/netcdf/v2.0/" \h][HYPERLINK "https://www.nodc.noaa.gov/data/formats/netcdf/v2.0/" \h] conventions provided by NOAA's National Centers for Environmental Information (NCEI).

Ship participation varied throughout the season, including 15 vessels:

- Amsterdam
- Carnival Legend
- Coral Princess
- Emerald Princess
- Eurodam
- Golden Princess
- Grand Princess
- Island Princess
- Nieuw Amsterdam
- Noordam
- Ruby Princess
- Star Princess
- Volendam
- Westerdam
- Zaandam

Four parameters were measured:

- conductivity

- temperature
- pH
- turbidity

Conductivity was converted to salinity at the request of ADEC (email communication with Jeanne Swartz, ADEC, 6/1/2018), following the guidelines of [HYPERLINK "http://www.teos-10.org/pubs/gsw/html/gsw_SP_from_C.html" \h], and using the calibration temperature of 25 °C (email communication with Igor Valle, Costa, 7/26/2018).

Task 3. Routinely monitor real-time data feeds and weekly summaries to ensure data system health. Weekly communication between Costa and Axiom Data Science ensured that all systems were operational and that suspect data was identified and relayed to Carnival for equipment monitoring.

Task 4. Participate in the preparation of a final report to be provided to ADEC and EPA at the end of the 2018 cruise season.

Task 5. Securely store all data during the life of the project and beyond. Carnival data is stored on Axiom's redundant server bank in both CSV and netCDF formats. Both formats are available for return to Carnival upon request.

Deliverables

This project has generated four main products:

1. A database containing water quality data ingested from Carnival's real-time data reported by 15 ships in Alaska waters during the 2018 cruise season.

2. Data submission to ADEC. Raw data was transferred from Carnival to Axiom, and formatted by Axiom to meet ADEC's requirements.

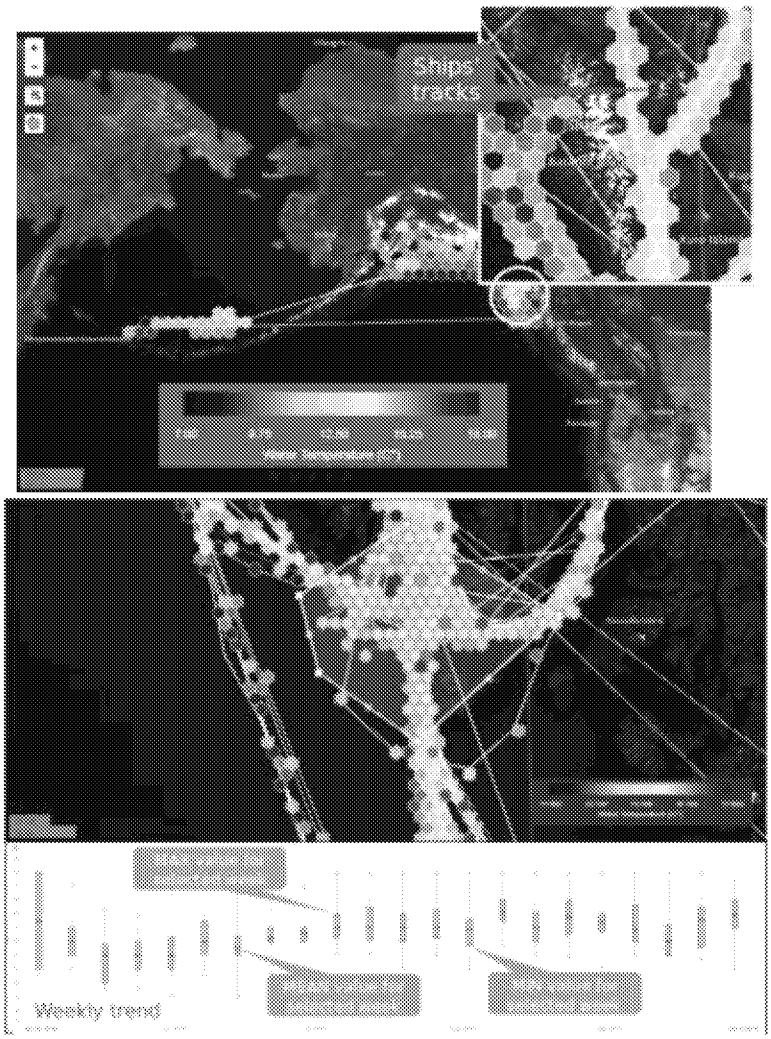
3. A web-based interface (the "[HYPERLINK "http://dev.axiomdatascience.com/?portal_id=107" \l "map" \h]") hosted on Axiom's infrastructure, for perpetuity, and connected to the sensor database that displays weekly summaries and heat map visualization of water quality criteria for access by Carnival and management agency personnel as identified and agreed by Carnival. The portal is linked to performance monitoring systems to ensure the health of the data system. The Carnival data portal is a modern HTML5 platform for data visualization, exploration, and download. The portal features an intuitive interface to select from the various ships and measurement parameters, with the addition of "Number of measurements." Data is dynamically binned into hexagons at low zoom, and reverts to the 30-minute mean observations at high zoom. Hexagons or user-defined polygons can be created to view timeseries plots. Refer to figures on the following pages.

4. This final report, submitted to ADEC and EPA at the end of the 2018 cruise season containing water quality data generated during the project.

Carnival Data Portal: Seawater Temperature

Hexagon binning of temperature data collected by Carnival Ships (seawater inlet) operating in the region between April 30th to October 9th, 2018.

- 261,971 "Pass" of 583,829 total records (one every 3 minutes). An arbitrary max value was defined at 18 deg C. It is likely that measured temperatures on some ships are artificially high due to stagnant water within the water collection tank, or sensor proximity to engine room.
- Hexagon color corresponds to parameter value
- Lines show ship tracks

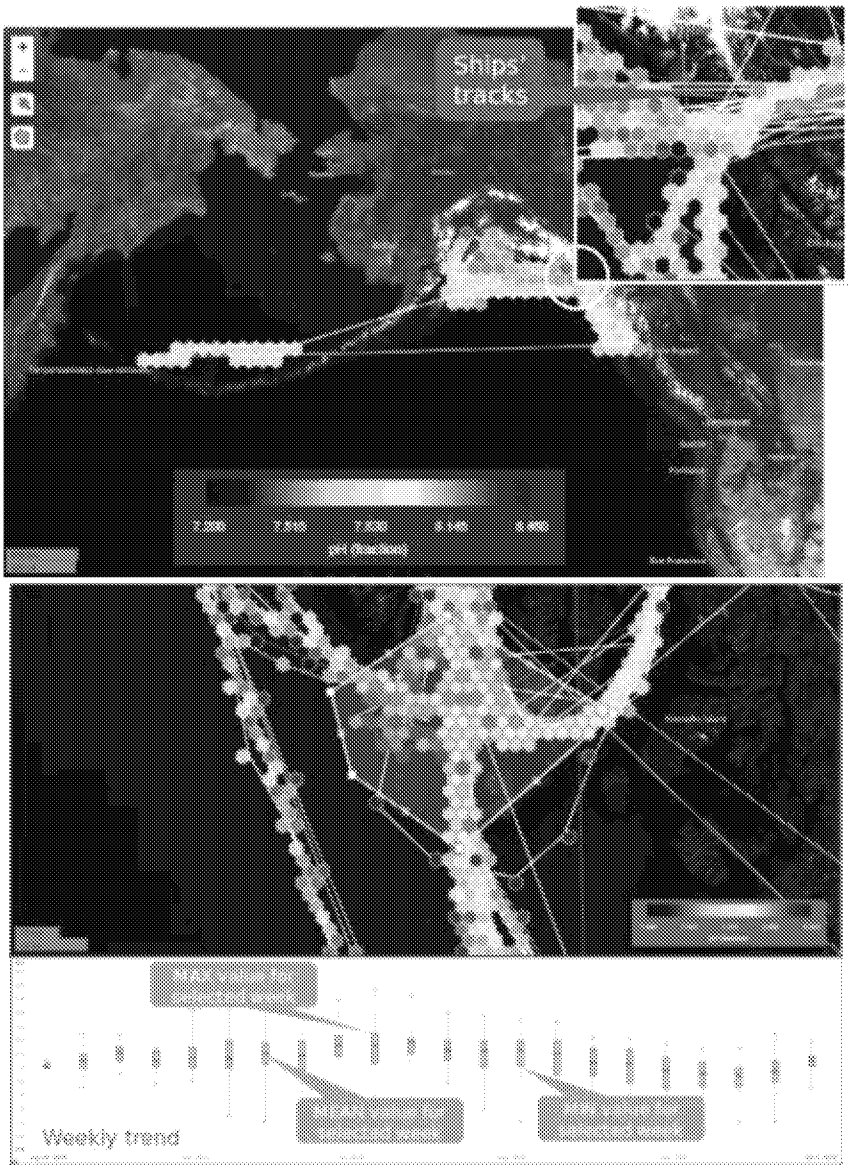


- Yellow polygon contains user-defined subset of data
- Box and whisker plots show weekly variation and seasonality
- Subset area seawater temperature values are:
    - Min 11 Deg C
    - Max 18 Deg C
    - Mean 14 Deg C

Carnival Data Portal: Seawater pH

Hexagon binning of pH data collected by Carnival Ships (seawater inlet) operating in the region between April 30th to October 9th, 2018.

- 369,320 "Pass" of 583,829 total records (one every 3 minutes)
- Hexagon color corresponds to parameter value
- Lines show ship tracks

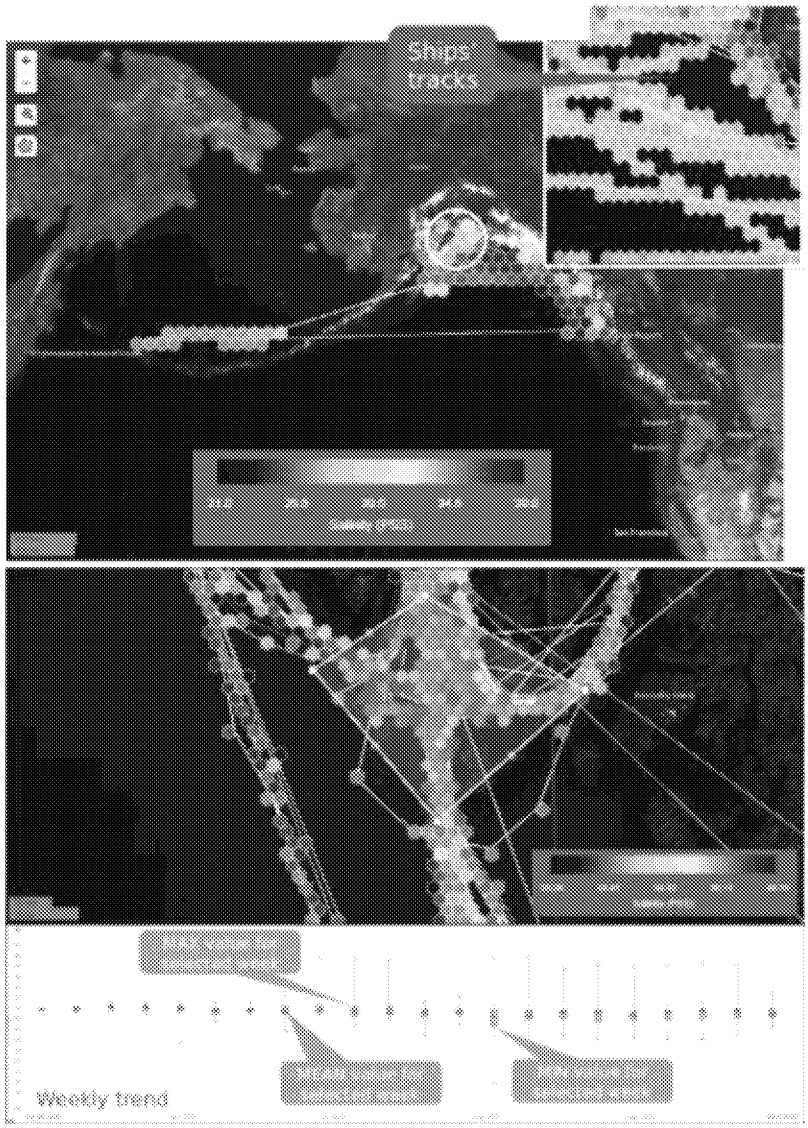


- Yellow polygon contains user-defined subset of data
- Box and whisker plots show weekly variation and seasonality
- Subset area seawater pH values are:
  - Min 7 pH
  - Max 8.95 pH
  - Mean 7.94 pH

Carnival Data Portal: Seawater Salinity

Hexagon binning of salinty data collected by Carnival Ships (seawater inlet) operating in the region between April 30th to October 9th, 2018. Salinity was calculated from conductivity.

- 332,293 "Pass" of 583,829 total records (one every 3 minutes)
- Hexagon color corresponds to parameter value
- Lines show ship tracks

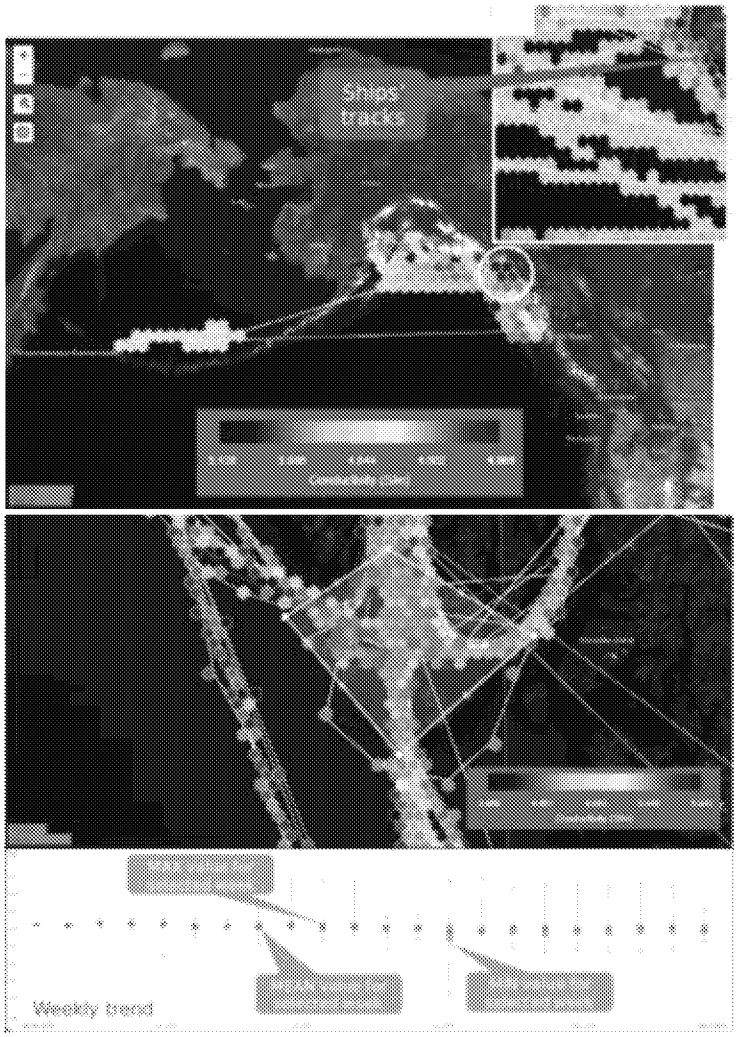


- Yellow polygon contains user-defined subset of data
- Box and whisker plots show weekly variation and seasonality
- Subset area seawater salinity values are:
    - Min 16 PPS
    - Max 40 PPS
    - Mean 28 PPS

Carnival Data Portal: Seawater Conductivity

Hexagon binning of conductivity data collected by Carnival Ships (seawater inlet) operating in the region between April 30th to October 9th, 2018.

- 332,293 "Pass" of 583,829 total records (one every 3 minutes)
- Hexagon color corresponds to parameter value
- Lines show ship tracks

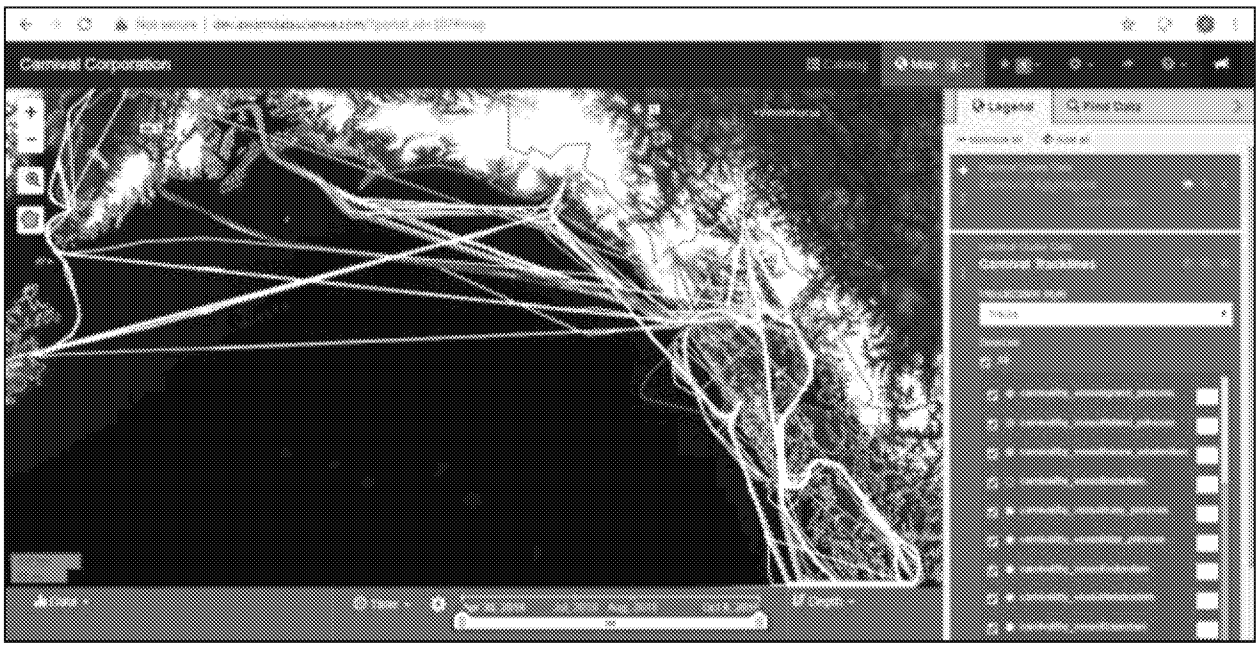


- Yellow polygon contains user-defined subset of data
- Box and whisker plots show weekly variation and seasonality
- Subset area seawater conductivity values are:
    - Min 2.560 S/m
    - Max 5.979 S/m
    - Mean 4.522 S/m

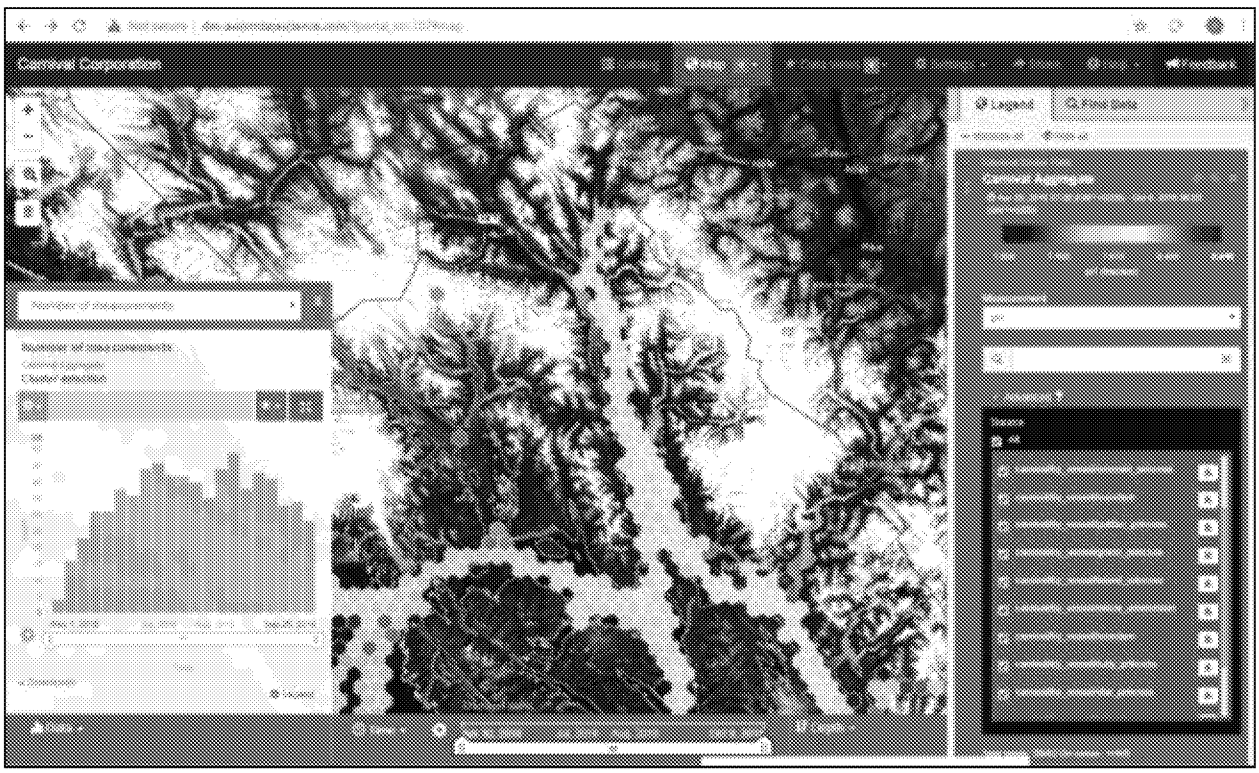
Carnival Data Portal: Comparison Data View

Advanced users can compare geographical and temporal observations by selecting multiple regions in the *Data views* interface.

Carnival Data Portal showing Carnival 2018 ship tracks



Juneau to Skagway pH measurements and observation summary



Lynn Canal pH measurements May to September 2018

Skagway Piers and pH trend May to September 2018

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
* Vessel Name	* EGS Unit Descriptor	* Sample Event Number	* Discharge sampling performed downstream of treatment but upstream of any dilution prior to discharge?	* Flow Rate	* Flow Rate Units	* Treated exhaust gas scrubber discharge washwater sample taken when vessel in US waters?	* Discharge Location - Latitude	* Discharge Location - Longitude	* Max Cont. Rating for 60% (in MWh)	* pH probe reading at time discharge water sampled (S.U.)	* Did you monitor PAHs continuously for exhaust gas scrubber water discharges at the time of sample collection?	* PAH probe reading at time discharge water sampled (ug/l PAHphe)	* Turbidity Probe reading at time discharge water sampled	* Turbidity probe units
text A(1) - A(500)	text A(1) - A(500)	text A(1) - A(150)	drop down	up to 6.3 digits N(1) - N(6.3) [e.g. 876.543]	drop down	drop down	up to 2.6 digits positive or negative N(1) - N(2.6)	up to 3.6 digits positive or negative N(1) - N(3.6)	up to 4.2 digits N(1) - N(4.2)	up to 2.2 digits N(1) - N(2.2)	drop down	up to 4.3 digits N(1) - N(4.3)	up to 5.2 digits N(1) - N(5.2)	drop down
Carnival Ecstasy	Sea Suction	31502188001; 3	N											
Carnival Ecstasy	DG # 3 DeSox O	31502188003; 3	Y	544.000	cubic meters/hour	N	26.060000	78.260000	61.00	6.40	Y	51.000	2.00	FNU
Carnival Ecstasy	DG # 3 O8 Disc	31502188005; 3	Y	544.000	cubic meters/hour	N	26.060000	78.260000	61.00	6.40	Y	51.000	2.00	FNU
Carnival Ecstasy	DG # 4 DeSox O	31502188007; 3	Y	533.000	cubic meters/hour	N	26.080000	78.170000	68.00	6.40	Y	23.000	1.00	FNU
Carnival Ecstasy	DG # 4 O8 Disc	31502188009; 3	Y	533.000	cubic meters/hour	N	26.080000	78.170000	68.00	6.40	Y	23.000	1.00	FNU
Carnival Pride	DG #1, 2 & 3 De	31501017003; 3	Y	658.000	cubic meters/hour	N	34.197600	76.108700	75.10	6.25	Y	9.200	2.67	FNU
Carnival Pride	DG #1, 2 & 3 O	31501017005; 3	Y	658.000	cubic meters/hour	N	34.197600	76.108700	75.10	6.25	Y	9.200	2.67	FNU
Carnival Pride	DG #4, 5 & 6 De	31501017007; 3	Y	603.000	cubic meters/hour	N	34.197600	76.108700	77.00	6.26	y	10.490	3.94	FNU
Carnival Pride	DG #4, 5 & 6 O	31501017009; 3	Y	603.000	cubic meters/hour	N	34.197600	76.108700	77.00	6.26	y	10.490	3.94	FNU
Carnival Pride	Sea Suction	31501017001; 3	N		cubic meters/hour	N								
Carnival Pride	DG #1, 2 & 3 De	31502215003; 3	Y	564.000	cubic meters/hour	N	36.070000	75.170000	78.00	6.30	Y	24.000	21.00	FNU
Carnival Pride	DG #1, 2 & 3 O	31502215005; 3	Y	564.000	cubic meters/hour	N	36.070000	75.170000	78.00	6.30	Y	24.000	21.00	FNU
Carnival Pride	DG #4, 5 & 6 De	31502215007; 3	Y	455.000	cubic meters/hour	N	35.430000	75.100000	75.00	5.70	Y	11.000	9.00	FNU
Carnival Pride	DG #4, 5 & 6 O	31502215009; 3	Y	455.000	cubic meters/hour	N	35.430000	75.100000	75.00	5.70	Y	11.000	9.00	FNU
Carnival Pride	Sea Suction	31502215001; 3	N		cubic meters/hour	N								

Message

From: Faulk, Jack [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=F9CFA7B91C14422B924D5C9F71E83DC7-FAULK, JACK]
Sent: 12/6/2017 5:06:06 PM
To: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Sayers-Fay, Andrew L (DEC) (andrew.sayers-fay@alaska.gov) [andrew.sayers-fay@alaska.gov]
CC: 2tomdow Ex. 6 Personal Privacy (PP) ; Valerie Chatterley Ex. 6 Personal Privacy (PP) [vchatterley Ex. 6 Personal Privacy (PP)
Subject: RE: Confirmation of salinity/conductivity sensor

Hi Mike,

I will get back to you tomorrow with my thoughts on this. Thanks.

Jack

From: Kaczmarek, Michael (CarnCorp) [mailto:MKaczmarek@carnival.com]
Sent: Tuesday, December 05, 2017 11:44 PM
To: Faulk, Jack <Faulk.Jack@epa.gov>; Sayers-Fay, Andrew L (DEC) (andrew.sayers-fay@alaska.gov) <andrew.sayers-fay@alaska.gov>
Cc: 2tomdow Ex. 6 Personal Privacy (PP) ; Valerie Chatterley Ex. 6 Personal Privacy (PP) <vchatterley07 Ex. 6 Personal Privacy (PP)
Subject: Confirmation of salinity/conductivity sensor

Dear Jack, Andrew;
Please note further below the EGCS inlet water sensors already installed or will be installed for the next summer season in Alaska, for data gathering for SEP (Supplemental Environmental Project) purposes. *Please also confirm that what is proposed for salinity/conductivity in particular is OK* – we are also asking the candidate SEP analysis companies for comment.

The current situation for "Rack 1" (inlet) is:

1. pH meter: already installed on all except 1-2 of next season's 15 EGCS ships; will be installed on all.
2. Turbidity: already installed on all EGCS ships.
3. Temperature: already installed on most EGCS ships; we intend to install on all.
4. **Salinity/Conductivity**: not yet installed, but we intend to install on most/all Alaska ships.

Regards,
Mike

From: Paolo Gemme [mailto:gemme@ecospray.eu]
Sent: Tuesday, December 05, 2017 10:00 AM
To: Kaczmarek, Michael (CarnCorp)
Cc: Porcellacchia, Franco (CarnCorp); Maurizio Archetti; Emanuele Gariboldi; Tyrrell, James (CUK); Galati, Vincenzo (Contractor)
Subject: R: Draft SEP RFP

Dear Mike,

I'm attaching here the manuals of the instruments actually installed for the measurements below:

pH
Supplier: HACH

Model: pHD sc
Code: DPD2P1.99
Range: -2.0 ÷ 14.0 pH
Accuracy: ±0.02 pH

Turbidity
Supplier: HACH
Model: ULTRATURB sc
Code: LPV415.99.32001
Range: 0.0001 ÷ 1000 FNU
Accuracy: ±0.008 FNU

Temperature
Supplier: Endress Hauser
Model: Omnigrad M TR12
Code: TR12-ABY0SEB20000
Range: -200 ÷ 600 °C
Accuracy: ± 0.15 + 0.002 · |t| (absolute temperature ➔ if max 40° = ± 0.23 °C)

Concerning the salinity sensor HACH proposal is to use the Conductivity sensor as this can be configured for measuring TDS (Total Dissolved Solids). This is the same instrument once installed on Rack01 I'm attaching here the manual of the sensor with highlighted the ref. to TDS.

Salinity
Supplier: HACH
Model: 3700 sc Inductive Conductivity sensor
Code: 3725E2T
Range: 2 ÷ 42 psu
Accuracy: ± 0,5% of reading

This instrument will be able to measure the so called "practical salinity" which is related to conductivity through a standard factor (considering all the ions as KCl, the unit of measure is psu = practical salinity unit). I found out this is a standard way to measure salinity for seawater, a real measure of salinity can be done only in the laboratory. More info at the following link:

http://www.fondriest.com/environmental-measurements/parameters/water-quality/conductivity-salinity-tds/

We remain at Your disposal for any further clarification,
Thanks and Regards,

Paolo GEMME
(Service Manager)

Ecospray Technologies S.r.l.
Via Circonvallazione, 14
15050 Alzano Scrivia - AL
Italy

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Mob: +39 392 9122718
Fax: +39 0131 854617
Skype: paolo.gemme
Web: www.ecospray.eu

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Contract Sulfur Content by mass = 2.0% +/- 0.2
Average position of the sampling point relative to the discharge point = 4 m
VGP pH limit = 6.0
Interim effluent limit = 5.7
pH differential limit = 2.0

ShipName	DG	UTC time	Local time	Latitude	Longitude	SOG [kn]
Coral Prin	DG1	6/1/2017 0:00	5/31/2017 16:00	59.44575	-135.325	0.04
Coral Prin	DG1	6/1/2017 0:03	5/31/2017 16:03	59.44574	-135.325	0.03
Coral Prin	DG1	6/1/2017 0:06	5/31/2017 16:06	59.44574	-135.325	0.07
Coral Prin	DG1	6/1/2017 0:09	5/31/2017 16:09	59.44574	-135.325	0.03
Coral Prin	DG1	6/1/2017 0:12	5/31/2017 16:12	59.44574	-135.325	0.05
Coral Prin	DG1	6/1/2017 0:15	5/31/2017 16:15	59.44573	-135.325	0
Coral Prin	DG1	6/1/2017 0:18	5/31/2017 16:18	59.44573	-135.325	0.04
Coral Prin	DG1	6/1/2017 0:21	5/31/2017 16:21	59.44573	-135.325	0.04
Coral Prin	DG1	6/1/2017 0:24	5/31/2017 16:24	59.44572	-135.325	0.06
Coral Prin	DG1	6/1/2017 0:27	5/31/2017 16:27	59.44572	-135.325	0.07
Coral Prin	DG1	6/1/2017 0:30	5/31/2017 16:30	59.44572	-135.325	0.06
Coral Prin	DG1	6/1/2017 0:33	5/31/2017 16:33	59.44572	-135.325	0.05
Coral Prin	DG1	6/1/2017 0:36	5/31/2017 16:36	59.44572	-135.325	0.09
Coral Prin	DG1	6/1/2017 0:39	5/31/2017 16:39	59.44572	-135.325	0.03
Coral Prin	DG1	6/1/2017 0:42	5/31/2017 16:42	59.44572	-135.325	0.12
Coral Prin	DG1	6/1/2017 0:45	5/31/2017 16:45	59.44572	-135.325	0.07
Coral Prin	DG1	6/1/2017 0:48	5/31/2017 16:48	59.44572	-135.325	0.02
Coral Prin	DG1	6/1/2017 0:51	5/31/2017 16:51	59.44572	-135.325	0.01
Coral Prin	DG1	6/1/2017 0:54	5/31/2017 16:54	59.44572	-135.325	0.04
Coral Prin	DG1	6/1/2017 0:57	5/31/2017 16:57	59.44572	-135.325	0.08
Coral Prin	DG1	6/1/2017 1:00	5/31/2017 17:00	59.44572	-135.325	0.05
Coral Prin	DG1	6/1/2017 1:03	5/31/2017 17:03	59.44571	-135.325	0.04
Coral Prin	DG1	6/1/2017 1:06	5/31/2017 17:06	59.44571	-135.325	0.02
Coral Prin	DG1	6/1/2017 1:09	5/31/2017 17:09	59.44572	-135.325	0.04
Coral Prin	DG1	6/1/2017 1:12	5/31/2017 17:12	59.44571	-135.325	0.04
Coral Prin	DG1	6/1/2017 1:15	5/31/2017 17:15	59.44571	-135.325	0.02
Coral Prin	DG1	6/1/2017 1:18	5/31/2017 17:18	59.44572	-135.325	0.03
Coral Prin	DG1	6/1/2017 1:21	5/31/2017 17:21	59.44572	-135.325	0.06
Coral Prin	DG1	6/1/2017 1:24	5/31/2017 17:24	59.44573	-135.325	0.03
Coral Prin	DG1	6/1/2017 1:27	5/31/2017 17:27	59.44572	-135.325	0.04

Coral_06_2017

Contract Sulfur Content by mass = 2.0% +/- 0.2
Average position of the sampling point relative to the discharge point = 2 m
VGP pH limit = 6.0
Interim effluent limit = 5.7
pH differential limit = 2.0

ShipName	DG
Amsterdam	DG2
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Amsterdam_06_2017

Alaska Department of Environmental Conservation (ADEC) Comments on

APPENDIX A pH Data Collection Campaign in Alaska, Summer 2017

At the request of Carnival Corporation and EPA, ADEC offers these comments on *Appendix A pH Data Collection Campaign in Alaska, Summer 2017 EGCS Washwater pH Measurement Protocol.* We believe that Carnival, EPA, and ADEC share an interest in developing a robust data set to support future permit development. We believe that it is important for these data to capture the "worst case" conditions that the exhaust gas cleaner systems operate under. These suggestions are based on the experience ADEC's Cruise Ship Program has gained sampling in Alaska waters.

We hope that you find these suggestions to be useful in finalizing the sampling protocol, and we thank you for the opportunity to comment.

General Notes:

- We suggest involving the EGCS vendor in this project.
- We recommend clearly identifying which scrubber and engine units are in service during the test.
- We recommend identifying the team member responsible for each task in the sampling protocol.
- We recommend that field notes include a description of any unusual visual effects (e.g., foam or sheen) observed during sampling.
- We recommend collecting water temperature and salinity data. Past EGCS issues were suspected to be caused by the freshwater inputs to the receiving waters.

Sections:

A: Preparations:

- We recommend verifying the sulfur level of the fuel being used during the test, taking into account the possibility of mixing between different fuels.
- We recommend providing more information on how the pH meter used in the test will be calibrated. For example, will the meter be calibrated in seawater or freshwater?

B: Measurements

- We recommend a more descriptive identification for the location of the discharge than the frame number (e.g., distance from bow waterline and visually identifiable markers). Our experience with receiving water sampling suggests the frame number is not as useful for identifying a location outside the ship's hull.
- We recommend recording the onboard influent pH in addition to the overboard pH.
- Please explain "sufficiently remote" in Section B, Item 5 of the sampling protocol.
- In reference to Section B, Item 6, we recommend testing over the operational load of the engine/EGCS system. This could include idling, base load range, and maximum range.
- In reference to Section B, Item 9, we recommend visual checks of the plume to avoid the boat interfering with the plume.

C: Reporting Results:

- We recommend including all field notes in the final report.

D. Sampling pattern.

- We recommend sampling in a grid pattern within the area of the mixing zone. At the present time, the sampling protocol only require sampling along a straight line.
- We recommend extending sampling beyond 4 meters. Previous modeling suggests that the jet of the plume can extend further than 4 meters. Based upon previous experience, we recommend sampling out to 15 meters.

E Measurement Boat Position:

- We recommend including a discussion of what will be done if the discharge is on the dock side.
- We recommend including a discussion of how the boat will be positioned to minimize movement during sampling activities.

F. Sample Log:

- In the sample log, we recommend identifying tidal state, dock or anchorage location, which EGCS units are in operation, what engines are being used, and influent pH and salinity.
- We recommend defining the pump % listed in the sample log. Will this be based on maximum flow or rated capacity? Is resistance factored into this? Same comment for the engine load parameter.

Message

From: Rose, Cheryl [Rose.Cheryl@epa.gov]
Sent: 7/13/2017 3:30:56 PM
To: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Thomas Dow [Ex. 6 Personal Privacy (PP)]
CC: Pollins, Mark [Pollins.Mark@epa.gov]
Subject: RE: Carnival AOC and possible letter or email

Hi Mike,

Could you or Tom give me a call when you have a chance at 202-564-4136.

Thanks,

Cheryl

Cheryl T. Rose
Senior Attorney
Water Enforcement Division
Office of Civil Enforcement/OECA
202-564-4136

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-----Original Message-----
From: Kaczmarek, Michael (CarnCorp) [mailto:MKaczmarek@carnival.com]
Sent: Thursday, July 13, 2017 11:08 AM
To: Rose, Cheryl <Rose.Cheryl@epa.gov>; Thomas Dow [Ex. 6 Personal Privacy (PP)]
Cc: Pollins, Mark <Pollins.Mark@epa.gov>
Subject: RE: Carnival AOC and possible letter or email

Cheryl; I did send last night, will resend.

-----Original Message-----
From: Rose, Cheryl [mailto:Rose.Cheryl@epa.gov]
Sent: Wednesday, July 12, 2017 4:11 PM
To: Thomas Dow; Kaczmarek, Michael (CarnCorp)
Cc: Pollins, Mark
Subject: Carnival AOC and possible letter or email

Mike,

Just touching base - were you going to send me some draft language for a letter or email that you were hoping to see? I don't think it is possible for us to get a signed order by the end of the week, and it looks like Mark may be unavailable too.

Thanks,

Cheryl

Cheryl T. Rose
Senior Attorney
Water Enforcement Division
Office of Civil Enforcement/OECA
202-564-4136

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Message

From: Barrett, Jane F. [JBarrett@BlankRome.com]
Sent: 8/9/2017 4:05:39 PM
To: Rose, Cheryl [Rose.Cheryl@epa.gov]; Theis, Joseph [Theis.Joseph@epa.gov]
CC: Grasso, Jeanne [Grasso@BlankRome.com]; Clark, Kelly (HA Group) [KClark@HollandAmericaGroup.com]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Thomas Dow [Ex. 6 Personal Privacy (PP)]; Theis, Joseph [Theis.Joseph@epa.gov]; Pollins, Mark [Pollins.Mark@epa.gov]
Subject: Carnival CAFO draft 8-9-17.DOCX;Carnival Compliance Agreement and Schedule 8.9.17.DOCX
Attachments: Carnival CAFO draft 8-9-17.DOCX; Carnival Compliance Agreement and Schedule 8.9.17.DOCX

Hi Cheryl:

As we discussed, attached are the drafts of the documents which are now drafted as a Complaint, Consent Agreement and Final Order with the Schedule of Compliance as an attachment.
Both Mike and Tom have been traveling this week so they may have a few other comments. In the Attachment, I've highlighted a few sections and marked them for discussion so that we can focus on those as part of our meeting tomorrow.

Let me know if you have any questions.

Best,

Jane

Jane F. Barrett | Blank Rome LLP
1825 Eye Street NW | Washington, DC 20006
Phone: 202.420.2570 | Fax: 202.379.9316 | Email: JBarrett@BlankRome.com

****

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****

Parameter	VGP Scrubber Washwater Limitations	IMO/EU Scrubber Washwater Limitations	Venice Lagoon	**Grand Princess:** Sample Date: 8/30/14 (62NM from closest point of			**Costa Luminosa**: Sample Dates 6/4/14 (Olden, Norway) & 6/6/14 (traveling from		
				SW Inlet: 30-Aug-14	**SW Outlet: 30-Aug-14**	**Below the Scrubber: 30-Aug-14**	**SW Inlet: 04-Jun-14**	EGCS Drain: 04-Jun-14	**Overboard: 04-Jun-14**
Biochemical Oxygen Demand (5-day) (BOD)	Not Required	Not Required	25 mg/L	2.92 mg/L	3.72 mg/L	3.06 mg/L	Not Detected	Not Detected	Not Detected
pH	≥ 6.0 at ship's overboard discharge (during maneuvering/transit - max different of 2 pH btwn inlet and overboard discharge)	≥ 6.5 at ship's overboard discharge or plume at 4 meters (during maneuvering and transit - max difference of 2 pH allowed btwn ship's inlet and overboard discharge)	6.0 - 9.0	7.9	4.8 S.U.	6.3 S.U.	7.9 (Onboard Rack Measurement = 7.7)	3.9 (Onboard Rack Measurement = 7.7)	6.4 (Onboard Rack Measurement = 6)
Total Suspended Solids (TSS)	Not Required	Not Required	35 mg/L	Not Detected	Not Detected	Not Detected	<10 mg/L	<10 mg/L	<10 mg/L
Chemical Oxygen Demand (COD)	Not Required	Not Required	120 mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	390mg/L
Nitrate	No discharge allowed	prevent discharge of nitrates beyond that associated with a 12% removal of NOx from the exhaust, or beyond 60 mg/L normalized for a washwater discharge rate of 45 t/MWh whichever is greater	Not Required	Not Detected	Not Detected	Not Detected	<5.0 mg/L	<5.0 mg/L	<5.0 mg/L
Nitrite	prevent discharge of nitrites beyond that associated with a 12% removal of NOx from the exhaust, or beyond 60 mg/L normalized for a washwater discharge rate of 45 t/MWh whichever is greater	Not Required	0.3 mg/L	Not Detected	Not Detected	Not Detected	<10 mg/L	<10 mg/L	<10 mg/L
Total Phosphorus	Not Required	Not Required	1 mg/L	Not Detected	0.143 mg/L	Not Detected	Not Detected	Not Detected	Not Detected
Total Kjeldahl Nitrogen (TKN)	Not Required	Not Required	10 mg/L	0.263 mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Total Organic Carbon (TOC)	Not Required	Not Required	Not Required	1.40 mg/L	3.79 mg/L	1.91 mg/L	Not Detected	Not Detected	Not Detected
Organic Nitrogen Compounds	Not Required	Not Required	0.1 mg/L	0.263 mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Phosphate - P (kg/t)	Not Required	Not Required	0.5 mg/L	Not Detected	0.438 mg/L	Not Detected	Not Detected	Not Detected	Not Detected
Cadmium (g/t)	Not Required	N/A - periodic monitoring but no limit	5 µg/L	Not Detected	Not Detected	Not Detected	<0.50 mg/L	<0.50 mg/L	<0.50 mg/L
Zinc (g/t)	Not Required	N/A - periodic monitoring but no limit	250 µg/L	Not Detected	Not Detected	Not Detected	<1.0 mg/L	<1.0 mg/L	<1.0 mg/L
Total Dissolved Solids (TDS)	Not Required	Not Required	Not Required	33200 mg/L	34300 mg/L	33000 mg/L	Not Detected	Not Detected	Not Detected
Chlorides	Not Required	Not Required	300 mg/L	17600 mg/L	18800 mg/L	18300 mg/L	Not Detected	Not Detected	Not Detected
Sulphate	Not Required	Not Required	500 mg/L	Not Detected	Not Detected	Not Detected	2500 mg/L	2600 mg/L	2500 mg/L
Total Hydrocarbons	Not Required	Not Required	2 mg/L	0.393 mg/L	6.30 mg/L	1.08 mg/L	<0.1 mg/L	<0.1 mg/L	<0.1 mg/L
Aluminum	Not Required	Not Required	500 µg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Chromium	Not Required	N/A - periodic monitoring but no limit	100 µg/L	Not Detected	Not Detected	Not Detected	<0.50 mg/L	<0.50 mg/L	<0.50 mg/L
Hexavalent Chromium	Not Required	Not Required	0.1 mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Iron	Not Required	Not Required	500 µg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Copper	Not Required	N/A - periodic monitoring but no limit	50 µg/L	0.0203 mg/L	Not Detected	Not Detected	<0.10 mg/L	<0.10 mg/L	<0.10 mg/L
Nickel	Not Required	N/A - periodic monitoring but no limit	100 µg/L	Not Detected	0.0233 mg/L	0.0116 mg/L	<0.20 mg/L	<0.20 mg/L	<0.20 mg/L
Lead	Not Required	N/A - periodic monitoring but no limit	50 µg/L	Not Detected	Not Detected	Not Detected	<0.50 mg/L	<0.50 mg/L	<0.50 mg/L
Selenium	Not Required	Not Required	10 µg/L	Not Detected	0.0590 mg/L	Not Detected	<0.40 mg/L	<0.40 mg/L	<0.40 mg/L
Vanadium	Not Required	N/A - periodic monitoring but no limit	50 µg/L	Not Detected	Not Detected	Not Detected	<5.0 mg/L	<5.0 mg/L	<5.0 mg/L
Total Phenols	Not Required	Not Required	50 µg/L	86.1 (49.0-120%)	79.7 (49.0-120%)	93.2 (49.0 - 120%)	Not Detected	Not Detected	Not Detected
Arsenic	Not Required	N/A - periodic monitoring but no limit	10 µg/L	Not Detected	Not Detected	Not Detected	<0.50 mg/L	<0.50 mg/L	<0.50 mg/L
PAH	50 µg/L above inlet water PAH concentration for washwater flow rates normalized by 45 t/MWh	50 µg/L above the inlet water PAH concentration for washwater flow rates normalized to 45 t/MWh	Not Required	Phenanthrene - Not Detected	Phenanthrene - Not Detected	Phenanthrene - Not Detected	1) Total PAH: <0.1 ppb 2) Onboard Rack Measurement: 0.0 ppb 3) Phenanthrene: <0.1 µg/L	1) Total PAH: 0.7 ppb 2) Onboard Rack Measurement: 140 ppb 3) Phenanthrene: <0.1 ppb	Not Detected
Turbidity	25 FNU/25 NTU	25 FNU/25 NTU	Not Required	Not Detected	Not Detected	Not Detected	<1 NTU (Onboard Rack Measurement = 0.2 FNU)	2 NTU (Onboard Rack Measurement = 2.9 FNU)	<1 NTU

Cell: B1
Comment: Brake, Aubrie:
State Specific Limitations:
California - All discharges prohibited in state Water Quality Protection Areas. There shall be no oily sheen from any discharge, and oil and grease shall not exceed 15 mg/l.
Connecticut - Discharge of EGCS washwater is prohibited

Cell: A6
Comment: Scotz, Tina (HAL):
Should collect inlet samples wherever you collect outlet samples so you can understand the contribution of the scrubber. Data are meaningless without the inlet tom compare it to.

Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 4/12/2017 7:48:56 AM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; DeBord, Steven [DeBord.Steven@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; MTES/MARPOL (Marpol) [marpol@lr.org]; Americas - NASE [americas.nase@lr.org]; MTES/ENG (Engineering) [engineering@lr.org]
Subject: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) on MV Carnival Dream
Attachments: MV Carnival Dream-EGCS Supporting Info-USCG.pdf; MV Carnival Dream-EGCS Notification Letter-USCG.pdf; MV Carnival Dream-EGCS Serial Numbers-USCG.pdf

Dear Capt. Rand,

Please find attached letter and supporting documentation for your notification of EGCS installations on board *M/V Carnival Dream, IMO 9378487*. Please could you acknowledge receipt of this notification.

If you need any further information for your records, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST
Specialist, Engineering
Engineering Systems & MARPOL Department
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E darren.davies@lr.org

Lloyd's Register Marine & Offshore
Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.
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United States Coast Guard
USCG Headquarters
Washington, DC
US

Lloyd's Register North America Inc,
1715 114th Ave SE, Ste 120,
Bellevue,
WA98004, USA

CARNIVAL CRUISE LINES
Carnival Place
3655 NW 87TH Avenue
Miami,
FL 33178, USA

Re: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for M/V CARNIVAL DREAM IMO 9378474

Ref: USCG-CVC Policy Letter 12-04 of 25 July 2012

Dear CAPT Rand;

In accordance with the requirements of Article 5.b.ii. of the Reference and our telephone call of 12 December, 2014, the following documents are attached for USCG and US EPA review of the proposed approval of the Exhaust Gas Cleaning Systems to be issued on behalf of the Government of Panama:

- Copy of ship's IAPP, Article 2.6 endorsement.
- Completed Lloyd's Register Surveyors Checklist for "SOX Scrubber Scheme B".

Lloyd's Register surveyors have observed the safe operation of the EGCS system onboard M/V Carnival Dream. We confirm that the Onboard Monitoring Manual (OMM), EGCS Technical Manual – Scheme B (ETMB), and Sulphur Emission Control Plan (SECP) have been reviewed, accepted and stamped by Lloyd's Register. We also confirm that these documents are physically held onboard the ship, and that the manuals have been verified to accurately represent the installed EGC Systems.

We kindly request your confirmation of this submission, which will complete the approval process and use of the system inside the North American Emission Control Area (ECA) during completion of any further USCG/EPA review.

Sincerely,

D.L.Davies
Lloyd's Register EMEA

Lloyd's Register

Lloyd's Register

Carnival Cruise Lines

Exhaust Gas Cleaning System
Technical Manual – Scheme B

Open-Loop Seawater DeSOx Absorption System 'ECO-DeSOx™' for MV Carnival Dream

This Technical Manual describes the Exhaust Gas Cleaning System Scheme B (ETM-B). It has been developed in accordance with the requirements given in the 2015 Guidelines for Exhaust Gas Cleaning Systems – MEPC-259(68) Section 5.6.1

Purchase Order number:	**1057216**
Job number:	**2014_104_APC**
Ship name:	**MV Carnival Dream**
IMO number:	**9378474**
System manufactured by:	**Ecospray Technologies S.r.l., Alzano Scrivia, Alessandria, Italy**
Unit model:	**ECO-DeSOx**
Ecospray project number:	**14-104-APC**

An EGC System is fitted for SOx emission control purposes to each of the DGs listed below, and each DG has a designated DeSOx Tower:

Diesel Generator number:	4	5	6
Location in ship:	**Engine room (Aft)**	**Engine room (Aft)**	**Engine room (Aft)**
Engine:	**Wartsila 12V46C**	**Wartsila 12V46C**	**Wartsila 12V46C**
MCR:	**12,600kW**	**12,600kW**	**12,600kW**
Speed:	**514 rpm**	**514 rpm**	**514 rpm**
Cycle:	**4-stroke**	**4-stroke**	**4-stroke**
DG Serial number:	**PAAE059489**	**PAAE059490**	**PAAE059491**
EGC Tower number:	**14-104-APCW-0100**	**14-104-APCW-0200**	**14-104-APCW-0300**

Approved in accordance with regulation 4 of MARPOL Annex VI as an equivalent means of achieving compliance with regulation 14 of that Annex.

If amendments are necessary to the contents of this Manual, either as replacement or additional pages, these are to be approved by the Administration before implementation.

Client:	**Carnival Cruise Lines**
Revision:	**15 February 2017**

Prepared by	Checked by	Approved by
Paolo Feltri		
Paolo Feltri	**Fabio Calcagno**	**Maurizio Archetti**

International Air Pollution Prevention Certificate
The Republic of Panama

NOTE: This Certificate shall be supplemented by Record of Construction and Equipment No: **9378474/06**

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention") **under the authority of the Government of the Republic of Panama** by Lloyd's Register Group Limited.

	Particulars of Ship
Name of ship	**CARNIVAL DREAM**
Distinctive number or letters	**3ETA7**
Port of registry	**PANAMA**
Gross tonnage	**128,251**
IMO number	**9378474**

This is to certify:

1. that the ship has been surveyed in accordance with regulation 5 of Annex VI of the Convention; and

2. that the survey shows that the equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

Completion date of the survey on which this Certificate is based: **24 August 2014**

This certificate is valid until **17 September 2019** subject to surveys in accordance with regulation 5 of Annex VI of the Convention.

Issued at **Miami** on **02 April 2017**

Lloyd's Register North America, Inc.
F. Yanez
Miami Office

F. Yanez
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

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Endorsement for annual and intermediate surveys

This is to certify that at a survey required by regulation 5 of Annex VI of the Convention the ship was found to comply with the relevant provisions of that Annex:

Annual survey

Signed:
Place of survey **New Orleans, LA**
Date **13 September 2015**

Lloyd's Register North America, Inc.
F. Yanez
Miami Office

John Eck

Annual* survey

Signed:
Place of survey **New Orleans, LA**
Date **04 September 2016**

Lloyd's Register North America, Inc.
F. Yanez
Miami Office

Irwin Fonseca

Intermediate* survey

Signed:
Place of survey
Date

Annual survey

Signed:
Place of survey
Date

Annual/Intermediate survey in accordance with regulation 9.8.3

This is to certify that, at an **Annual/Intermediate*** survey in accordance with regulation 9.8.3 of Annex VI of the Convention, the ship was found to comply with the relevant provisions of that Annex:

Signed:
Place of survey
Date

* *Delete as appropriate*

Form 2228PAN (2015.06.11)

Endorsement to extend the certificate if valid for less than 5 years where regulation 9.3 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.3 of Annex VI of the Convention, be accepted as valid until

Signed: .....
Place of survey
Date

Endorsement where the renewal survey has been completed and regulation 9.4 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.4 of Annex VI of the Convention, be accepted as valid until

Signed: .....
Place of survey
Date

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 9.5 or 9.6 applies

This certificate shall, in accordance with **regulation 9(5) or 9(6)*** of Annex VI of the Convention, be accepted as valid until

Signed: .....
Place of survey
Date

Endorsement for advancement of anniversary date where regulation 9.8 applies

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: .....
Place of survey
Date

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: .....
Place of survey
Date

** Delete as appropriate*

Record of Construction and Equipment

Supplement to the International Air Pollution Prevention Certificate (IAPP Certificate)

Notes:

1 This Record shall be permanently attached to the IAPP Certificate. The IAPP Certificate shall be available on board the ship at all times.

2 The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.

3 Entries in boxes shall be made by inserting either a cross (X) for the answer "yes" and "applicable" or a (-) for the answers "no" and "not applicable" as appropriate.

4 Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and resolutions or circulars refer to those adopted by the International Maritime Organisation.

1. Particulars of Ship:

1.1	Name of ship	**CARNIVAL DREAM**
1.2	IMO number	**9378474**
1.3	Date on which keel was laid or ship was at a similar stage of construction	**30 May 2007**
1.4	Length (L)[1] metres	**Not Applicable**

2. Control of emissions from ships

2.1 Ozone depleting substances (regulation 12)

2.1.1 The following fire extinguishing systems, other systems and equipment containing ozone-depleting substances, other than hydro-chlorofluorocarbons (HCFCs), installed before 19 May 2005 may continue in service:

System or equipment	Location on board	Substance

2.1.2 The following systems containing HCFCs installed before 1 January 2020 may continue in service:

System or equipment	Location on board	Substance

[1] *Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely for recreational purposes and to which, in accordance with regulation 13.5.2.1 or regulation 13.5.2.3, the NOx emission limit as given by regulation 13.5.1.1 will not apply.*

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2.2 Nitrogen oxides (NOx) (regulation 13):

2.2.1 The following marine diesel engines installed on this ship are in accordance with the requirements of regulation 13, as indicated:

	Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)		Engine #1	Engine #2	Engine #3	Engine #4	Engine #5
1	Manufacturer and model		**Wartsila W12V46C**	**Wartsila W12V46C**	**Wartsila W12V46C**	**Wartsila W12V46C**	**Wartsila W12V46C**
2	Serial number		**PAAE059485**	**PAAE059487**	**PAAE059488**	**PAAE059489**	**PAAE059490**
3	Use (applicable application cycle(s) – NTC 3.2)		**Test Cycle E2**	**Test Cycle E2**	**Test Cycle E2**	**Test Cycle E2**	**Test Cycle E2**
4	Rated power (kW) (NTC 1.3.11)		**12,600**	**12,600**	**12,600**	**12,600**	**12,600**
5	Rated speed (RPM) (NTC 1.3.12)		**514**	**514**	**514**	**514**	**514**
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2		**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
8b		13.2.1.2 & 13.2.3	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
8c		13.2.1.3 & 13.2.3	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
9a	Tier I	13.3	**X**	**X**	**X**	**X**	**X**
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12		installed	--	--	--	--	--
13	AM*	not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

	Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)		Engine #6	Engine #7	Engine #8	Engine #9	Engine #10
1	Manufacturer and model		**Wartsila W12V46C**				
2	Serial number		**PAAE059491**				
3	Use (applicable application cycle(s) – NTC 3.2)		**Test Cycle E2**				
4	Rated power (kW) (NTC 1.3.11)		**12,600**				
5	Rated speed (RPM) (NTC 1.3.12)		**514**				
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2		**Not Applicable**				
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	**Not Applicable**				
8b		13.2.1.2 & 13.2.3	**Not Applicable**				
8c		13.2.1.3 & 13.2.3	**Not Applicable**				
9a	Tier I	13.3	**X**	--	--	--	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

2.3 Sulphur oxides (SOx) and particulate matter (regulation 14)

2.3.1 When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:

2.3.1.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

-- 4.50% m/m (not applicable on or after 1 January 2012); or

X 3.50% m/m (not applicable on or after 1 January 2020); or

X 0.50% m/m, and/or

2.3.1.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:

-- 4.50% m/m (not applicable on or after 1 January 2012); or

X 3.50% m/m (not applicable on or after 1 January 2020); or

X 0.50% m/m

2.3.2 When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:

2.3.2.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

-- 1.00% m/m (not applicable on or after 1 January 2015); or

X 0.10% m/m, and/or

2.3.2.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:

-- 1.00% m/m (not applicable on or after 1 January 2015); or

X 0.10% m/m

2.4 Volatile organic compounds (VOCs) (regulation 15)

-- 2.4.1 The tanker has a vapour collection system installed and approved in accordance with MSC/Circ.585.

Approval certificate number	Approved operations manual	Approving authority	Date

-- 2.4.2.1 For a tanker carrying crude oil, there is an approved VOC Management Plan

2.4.2.2 VOC Management Plan approval reference:

Approval certificate number	Approved operations manual	Approving authority	Date

2.5 Shipboard incineration (regulation 16)

The ship has an incinerator:

2.5.1 installed on or after 1 January 2000 that complies with:

X 2.5.1.1 resolution MEPC.76(40), as amended*

Manufacturer and model	Serial number	Type test certificate number
Norsk Inova AS NH 1400-2100Kw	**14245/1**	**MED-B-3862**

-- 2.5.1.2 resolution MEPC.244(66)

Manufacturer and model	Serial number	Type test certificate number

* As amended by resolution MEPC.93(45).

2.5.2 installed before 1 January 2000 that complies with:

-- 2.5.2.1 resolution MEPC.59(33), amended**

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.2.2 resolution MEPC.76(40), amended*

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.3 installed before 1 January 2000 and which does not comply with resolution MEPC.76(40) as amended or resolution MEPC.59(33) as amended.

Manufacturer and model	Serial number	Type test certificate number

2.6 Equivalents (regulation 4)

The ship has been allowed to use the following fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to that required by this Annex:

System or equipment	Equivalent used	Approval reference	Method
No. 4 Diesel Generator	**EGCS MEPC.259(68) Scheme-B**	**SOUTSO/MPL/28503770**	**Wet Open-loop EGCS**
No. 5 Diesel Generator	**EGCS MEPC.259(68) Scheme-B**	**SOUTSO/MPL/28503770**	**Wet Open-loop EGCS**
No. 6 Diesel Generator	**EGCS MEPC.259(68) Scheme-B**	**SOUTSO/MPL/28503770**	**Wet Open-loop EGCS**

This is to certify that this Record is correct in all respects.

Issued at **Miami** on **02 April 2017**

Lloyd's Register North America, Inc.
F. Yanez
Miami Office

F. Yanez
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

* As amended by resolution MEPC.93(45).
** As amended by resolution MEPC.92(45).

Form 2177 (2016.02)

Exhaust Gas Cleaning System Initial Survey Checklist

Ship Name	IMO Number
CARNIVAL DREAM	**9318434**

Port of Registry

PANAMA

Notes:-

1 Mark Boxes 'Yes' for compliant with 'No' for not compliant or 'NA' for not applicable
2 Part 1 AA, AB and BA are to be completed for ALL initial surveys
3 Part 2 complete the items for surveying the ECCS for compliance with LR Rule requirements (pt. 2, Ch. 34)
4 Part 3 complete for surveying the ECCS for compliance with statutory requirements (IMO Res. MEPC.259(68))

Part 1 - General			
AA	**General**		
020	ECCS manufacturer	**Ecospray Technologies S.r.l.**	
100	ECCS type/Model	**ECO-DeSOx**	
120	Serial Number(s)	**14-104-VAC/M- 0100\0200\0300**	
200	ECCS exhaust gas flow capacity (m³/h)	**85,000**	
220	Engines connected to ECCS	**DG's 4, 2 & 6**	
220s	Engines max power rating (kW)	**15,000kW**	
300	Boilers connected to ECCS	**N\A**	
300s	Boilers max maximum firing rate	**N\A**	
320	The scrubber has been approved in accordance with:		
320s	MEPC.259(68) Scheme A and SO_x emission compliance certificate eligible		**No**
320P	MEPC.259(68) Scheme B?		**Yes**
AB	**National Administration Requirements**		
020	Have the consulting lines been checked to ascertain any legal requirements?		**Yes**
100	Have all legal requirements technical and reporting requirements been complied with?		**Yes**
BA	**Documentation – Design Approval**		
020	Design Approval Document issued and all comments closed out?		**Yes**
Part 2 - Survey of the ECCS			
CA	**Class Requirements Survey (part 2, Chapter 34)**		
	Sampling and piping		
020	Was the system including associated pumps, process tanks, piping and fittings examined for optional related and joint certificate?		**Yes**
100	Overboard discharge is below the water line of the ship when at its minimum operating draught?		**Yes**
120	Where bypass piping has been used with Bonded pipes that the pipes are joined in accordance with a procedure approved by LR and evidence of the compatibility of gasket material and Bonded is available for inspection?		**Yes**
200	Deck and Bulkhead penetrations installed for good workmanship and fitness?		**Yes**
220	For open loop ECCS, arrangements are in place to protect the system if the over Board discharge valve is closed and there is valve position indication at the control station?		**Yes**
300	Pipes are adequately supported?		**Yes**
320	As is a practicable, was the operation of the system continued? NOTE: the ROS not required ECCS to operate at full load or with high sulphur fuel and may be decommissioned by arrangement bunker and system without exhaust gas flow?		**Yes**
400	Was the operation of the overall protection arrangement continued by test or simulation including status and interlocks?		**Yes**
420	Does the ECCS serve more than one engine?		**No**
420s	If so, an isolation valve is fitted in the exhaust gas duct before the ECCS?		**NA**
500	Is the exhaust system fitted with a P_x-pass for the ECCS?		**No**
500s	If so, has the P_x-pass valve operation and valve position indication been continued?		**NA**
520	When the ECCS is unused, are Back pressure measurements for the exhaust system satisfied?		**Yes**
520s	Is the Back pressure within the maximum permitted levels for connected combustion machinery?		**Yes**
520P	When fitted, hydraulic clamps have been tested and in good condition?		**NA**

* Details as appropriate

Form 1100 (30.6.10)
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	Chemical substances and wash water	
000	Does the ECCS require any chemical substances for operation?	**No**
000a	Have chemical tanks, bunds and associated piping, diffuse and fugitive emissions been examined for options related to operation (only relevant options)?	**NA**
000b	Where applicable chemical tank capacity have been incorporated into noise calculations?	**NA**
000c	Where applicable, operation of drain closing valves on chemical tanks has been tested?	**NA**
000d	Where applicable, chemical tank vesting and cooling has been considered to be insignificant?	**NA**
000e	Chemical and water process tank high and low level protection has been tested, as applicable?	**NA**
000f	Chemical tank spill containment arrangements are in place in accordance with applicable FR Rules and in good condition?	**NA**
000g	Arrangements are in place for distribution, venting, bunding and marking safe chemical tanks so as to prevent safe maintenance and inspection?	**NA**
000h	Suitable access arrangements are in place for the ECCS and any associated tanks?	**NA**
	Electrical and control equipment	
100	Protection devices sufficient for all original electrical circuits are as per approved plans?	**Yes**
100a	ECCS emergency stop devices provided?	**Yes**
100b	ECCS status and anything and alarms indications have been tested as required by the analysis?	**Yes**
Part 3	**Safety Survey Requirements (IMO Res. MEPC.320(89))**	
DA	**Survey – Approved Documents**	
100	Have the following plans and documents been approved by or on behalf of the flag state with approved copies being available on-board? NOTE: If is accepted that the approved copies may be in electronic format for completion of the survey	
100a	For Emergency flag ship, a MED certificate for the ECCS has been issued (Schemes A - Module B) or will be issued (Schemes B - Module G)	**NA**
100b	The Shipboard Emissions Compliance Plan (SECP)	**Yes**
100c	The On-Board Monitoring Manual (OMM)	**Yes**
100d	The Emissions Technical Manual Scheme A or Scheme B (ETM-A or ETM-B), as applicable	**Yes**
100e	The Exhaust Gas Cleaning (EGC) Record Book as required by the OMM NOTE: Where it is proposed to use the access plans instead installance system to demonstrate compliance with any regulations contained within the approved documents in the section then the format of the electronic record is to be approved.	**Yes**
100f	Shipboard Emissions Compliance Certificate (SECC),(Scheme A only)	**NA**
100g	Any manuals, instruction Books or other documents which are referenced in the SECP, OMM or ETM-A or ETM-B	**Yes**
120	The vessel's information that holding brevention certification has been updated to reference the ECCS	**Yes**
500	Has vessel's flag Administration been notified of ECCS installation completion and update to IAPP	**Yes**
DB	**Scheme A Only**	
020	The required sensors, for the continuous monitoring of the parameters sized in the ETM-A, are fitted	**NA**
020a	Record and report of parameters can be produced in accordance with the ETM-A	**NA**
020b	Compliance checks carried out in accordance with the instructions contained in the ETM-A	**NA**
020c	Any shot checks of emissions included in the ETM-A have been carried out, any required sensors and equipment are installed as specified in the ETM-A NOTE: Where a ECCS approved in accordance with Scheme A is fitted with continuous exhaust gas emissions monitoring equipment in order to comply with regional or national regulation (e.g. the European Shipping Directive) then the arrangements are to be surveyed in accordance with DC.	**NA**
100	Check have been carried out to confirm that the ECCS system is in accordance with the arrangements proved in the ETM-A	**NA**
120	Verification of ECCS compliance completed in accordance with the instructions proved in the ETM-A	**NA**
DC	**Scheme B Only**	
020	The exhaust gas monitoring system has been demonstrated as being in working condition NOTE: the ECCS is not required to be fully operational to demonstrate that the monitoring system is in working condition. However if the monitoring system requires the ECCS to be in operation to allow verification then the ECCS will be required to be operational	**Yes**
020a	The zero and span checks were performed as per the OMM NOTE: manufacturer's commissioning record and calibration certificates are to be used to demonstrate that the equipment has been correctly calibrated for the application.	**Yes**
020b	Any other operating checks required by the OMM to ensure the required operation of the monitoring system have been performed NOTE: the system check (calibration/function check with point gas) is to be demonstrated.	**Yes**
100	The required sensors, for the daily shot checks of the parameters sized in the OMM, are fitted	**Yes**
120	The data recording components and arrangements for exhaust gas monitoring are as per the OMM	**Yes**
120a	The exhaust gas data recording system can produce the reports specified in the OMM	**Yes**
120b	Exhaust gas emissions reports inspected and demonstrate compliance with the applicable emission limits	**Yes**

* Delete as applicable

DD	Schedule A & Schedule B	
020	The compliance Service for which the ECCS is filed is in accordance with the description given in the ETM-A or ETM-B, as applicable?	**Yes**
100	The attachment of the ECCS and its associated equipment are given in the ETM-A or ETM-B, as applicable?	**Yes**
100a	The ECCS meet/meet modified system components and attachment are as per the OMM, including those applicable to the meet/meet equipment of other interfaces is identified in the ETM-A or ETM-B as applicable?	**Yes**
100b	The meet/meet test is in accordance with the assumed using in referencing the: a. Polycyclic Aromatic Hydrocarbons (PAH) b. Initial fuel applicable	**Yes**
100c	The meet/meet modifying system was measured in motion conditions? NOTE – This may be measured by manually adjusting brake associated with the system and operating the measured results	**Yes**
100d	The zero and span check of the meet/meet H_2, PAH and fuel modes were performed as per the OMM?	**Yes**
100e	In addition, any other operating checks required by the OMM to ensure the required operation were performed?	**Yes**
100f	The attachments are in place for the sampling and analysis of meet/meet uptake content?	**Yes**
100g	Meet/meet uptake analysis available and ECC record book kept?	**Yes**
100h	Discharged meet/meet binder H_2 measured externally from the ZHP (at rest in platform), as applicable?	**Yes**
100i	Meet meter displays H_2 has been verified by calculation or modelling as an alternative to physical measurement; details are included with the OMM?	**Yes**
300	The data recording component and attachments for meet/meet are as per the OMM?	**Yes**
300a	The meet/meet data recording system can produce the report specified in the OMM?	**Yes**
300b	Meet/meet report included and measurements comply with applicable emission limits?	**Yes**
300	The monitoring of the modified and recording system installation meet certificate?	**Yes**
320	Was it confirmed that ECCS and the fuel status operate satisfactorily?	**Yes**
400	Was it confirmed that when applicable sufficient consumables for recording devices are onboard?	**Yes**
420	The procedures given in the SECP are incorporated in the ship's operating procedures?	**Yes**
420a	Ship safety management system incorporates details of safe working procedures and equipment?	**Yes**
DE	**Remarks**	

Surveyed By

Place of Survey **COZUMEL/NEW ORLEANS** Date of Survey **02 April 2017**

Lloyds Register North America, Inc.
F. Yanez
Miami Office

F. YANEZ
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

* Delete as applicable

Form 1180 (2016.10)

IMO Number: 9378474

APPROVED

For and on behalf of the Government of the vessel's Registration, as shown in the attached Approval History, as complying with the Regulations stated below

EXHAUST GAS CLEANING (EGC) SYSTEM

The information contained in the SOx Emission Compliance Plan (SECP), Onboard Monitoring Manual (OMM) and EGC System Technical Manual "Scheme B" (ETM-B) have been examined for the compliance with Resolution MEPC. 259(68), Scheme 'B' (Continuous Monitoring with Parameter Checks), in accordance with Regulation 4.1 of the revised Marpol Annex VI, which allows the use of alternative compliance methods.

No alteration or revision shall be made to any part of this plan without the prior approval of the Lloyd's Register Group.

The Owner remains responsible for the accuracy of the information and details given in OMM, ETM-B and SECP.

Signed: _____ Date: 24 February 2017

Surveyor to Lloyd's Register EMEA

A Member of The Lloyd's Register Group

Approval for compliance with Marpol Annex VI Regulation 4.1 and Resolution MEPC. 259(68), Scheme 'B' is subject to satisfactory onboard survey, which includes functional test and calibration of exhaust gas and wash water monitoring systems.

Signed _____ Date: 02 APRIL 2017

Surveyor to Lloyd's Register .....

A Member of The Lloyd's Register Group

Approval is subject to verification that the arrangements onboard are identical to those described in SECP, OMM and ETM-B.

Signed _____ Date: 02 APRIL 2017

Surveyor to Lloyd's Register .....

A Member of The Lloyd's Register Group

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IMO No. 9378474

APPROVAL HISTORY			
Original approval:			
NAME	PORT OF REGISTRY AND FLAG	OFFICIAL NO. OR CALL SIGN	SURVEYOR/DATE
"CARNIVAL DREAM"	PANAMA	3ETA7	Nouman Ahmad Siddiqui 24 February 2017
Changes:			

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Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 4/15/2016 9:53:22 PM
To: Marine-eca [Marine-eca@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; tdow@carnival.com; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Recall: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line, Carnival UK, Princess Cruises, and Holland America Line - April 2015 Interim Reports

Brake, Aubrie (CarnCorp) would like to recall the message, "Carnival Corporation - Reporting on Behalf of Carnival Cruise Line, Carnival UK, Princess Cruises, and Holland America Line - April 2015 Interim Reports".

Message

From: Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]
on behalf of Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 3/28/2016 6:58:27 PM
To: 'Rand, Michael P CIV' [Michael.P.Rand@uscg.mil]; Wu, Max [Max.Wu@lr.org]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; engineering@lr.org
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; McClelland, Paul [Paul.Mcclelland@lr.org]; Tyrrell, James (CUK) [James.Tyrrell@carnivalukgroup.com]; alastair mitchell [Ex. 6 Personal Privacy (PP)]; Hicks, John [John.Hicks@lr.org]; MTES/MARPOL (Marpol) [marpol@lr.org]
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for CARNIVAL BREEZE IMO9555723 FLAG PANAMA
Attachments: IAPP Certificate.pdf

Capt Rand,

Not sure if you received the IAPP so here it is. Thanks.

B/R
Marilyn

Marilyn Santiesteban, Manager, Newbuild Deliveries / Corporate Shipbuilding / Marine Technology / Corporate Ship Refit
Carnival Corporation & plc | 3655 NW 87th Avenue, MCSB 1100, Miami, FL 33178 | 305-406-5050 (Main) | 305-406-5796 (Direct) | 305-406-5778 (Fax)
msantiesteban@carnival.com | www.carnivalcorp.com | www.worldsleadingcruiselines.com

-----Original Message-----
From: Rand, Michael P CIV [mailto:Michael.P.Rand@uscg.mil]
Sent: Monday, March 21, 2016 9:34 AM
To: Wu, Max; HQS-PF-fldr-ECA-Foreign; engineering@lr.org
Cc: samulski.michael@epa.gov; Kaczmarek, Michael (CarnCorp); McClelland, Paul; Tyrrell, James (CUK); alastair mitchell; Hicks, John; MTES/MARPOL (Marpol); Santiesteban, Marilyn (CarnCorp)
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for CARNIVAL BREEZE IMO9555723 FLAG PANAMA

Dear Mr. Wu:

I reviewed your submission for the CARNIVAL BREEZE, and did not find the IAPP Certificate (I received the supplement). Please send me a copy.

Thank you.

r/Mike Rand

-----Original Message-----
From: Wu, Max [mailto:Max.Wu@lr.org]
Sent: Thursday, March 10, 2016 6:03 AM
To: Rand, Michael P CIV; HQS-PF-fldr-ECA-Foreign
Cc: samulski.michael@epa.gov; Kaczmarek, Michael (CarnCorp); McClelland, Paul; Tyrrell, James (CUK); alastair mitchell; Hicks, John; MTES/MARPOL (Marpol); Santiesteban, Marilyn (CarnCorp)
Subject: [Non-DoD Source] USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for CARNIVAL BREEZE IMO9555723 FLAG PANAMA

Dear CAPT M. Rand,
Please find attached documents for your notification of the new EGCS installed on-board of CARNIVAL BREEZE (IMO 9555723). Thanks.

Best Regards,

Max Wu
Senior Emission Specialist
Lloyd's Register Global Technology Centre

T +44 (0) 3304140459
E max.wu@lr.org

Lloyd's Register EMEA

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF Visit www.lr.org

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International Air Pollution Prevention Certificate
The Republic of Panama

NOTE: This Certificate shall be supplemented by Record of Construction and Equipment No: 9555723/06

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention") under the authority of the Government of the Republic of Panama by Lloyd's Register Group Limited.

	Particulars of Ship
Name of ship	CARNIVAL BREEZE
Distinctive number or letters	3FZO8
Port of registry	PANAMA
Gross tonnage	128,052
IMO number	9555723

This is to certify:

1. that the ship has been surveyed in accordance with regulation 5 of Annex VI of the Convention; and

2. that the survey shows that the equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

Completion date of the survey on which this Certificate is based: 31 May 2012

This certificate is valid until 30 May 2017 subject to surveys in accordance with regulation 5 of Annex VI of the Convention.

Issued at Miami on 04 March 2016

Lloyd's Register North America Inc
J. J. Gustafsson
Miami Office
Lloyd's Register

J. Gustafsson
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

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Form 2228PAN (2014.06.11)

Endorsement for annual and intermediate surveys

This is to certify that at a survey required by regulation 5 of Annex VI of the Convention the ship was found to comply with the relevant provisions of that Annex:

Annual survey

Signed:
Place of survey Miami
Date 19 May 2013

Lloyd's Register North America Inc
J J Gustafsson
Miami Office
Lloyd's Register

E. Rodriguez

Intermediate* survey

Signed:
Place of survey Miami
Date 10 May 2014

Lloyd's Register North America Inc
J J Gustafsson
Miami Office
Lloyd's Register

E. Rodriguez

Annual* survey

Signed:
Place of survey Miami
Date 23 May 2015

Lloyd's Register North America Inc
J J Gustafsson
Miami Office
Lloyd's Register

P. Hadjisoteriou

Annual survey

Signed:
Place of survey
Date

Annual/Intermediate survey in accordance with regulation 9.8.3

This is to certify that, at an Annual/Intermediate* survey in accordance with regulation 9.8.3 of Annex VI of the Convention, the ship was found to comply with the relevant provisions of that Annex:

Signed:
Place of survey
Date

* *Delete as appropriate*

Form 2228PAN (2014.06.11)

Endorsement to extend the certificate if valid for less than 5 years where regulation 9.3 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.3 of Annex VI of the Convention, be accepted as valid until

Signed:
Place of survey
Date

Endorsement where the renewal survey has been completed and regulation 9.4 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.4 of Annex VI of the Convention, be accepted as valid until

Signed:
Place of survey
Date

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 9.5 or 9.6 applies

This certificate shall, in accordance with regulation 9(5) or 9(6)* of Annex VI of the Convention, be accepted as valid until

Signed:
Place of survey
Date

Endorsement for advancement of anniversary date where regulation 9.8 applies

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed:
Place of survey
Date

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed:
Place of survey
Date

** Delete as appropriate*

Form 2228PAN (2014.06.11)

Message

From: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
Sent: 8/8/2016 2:59:53 PM
To: Davies, Darren [Darren.Davies@lr.org]
CC: Greuel, Justin [Greuel.Justin@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]; Southampton, Client Management [southampton.client-management@lr.org]; Pritchard, Natasha [natasha.pritchard@lr.org]; Fasce, Matteo [Matteo.Fasce@lr.org]; Southampton [southampton@lr.org]
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Queen Mary 2, IMO 9241061

Dear Mr. Davies:

Thank you for submitting the documentation for the exhaust gas cleaning systems for the M/V QUEEN MARY 2.

I will contact you if I have additional questions.

Thank you.

r/Mike Rand

-----Original Message-----
From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Thursday, August 04, 2016 2:38 PM
To: Rand, Michael P CIV
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE; Southampton, Client Management; Pritchard, Natasha; Fasce, Matteo; Southampton
Subject: [Non-DoD Source] USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Queen Mary 2, IMO 9241061

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installed on M/V Queen Mary 2, IMO 9241061. Please could you acknowledge receipt of this notification.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=mq4U9OGGSHJaZO7bC-KAHMW5aBJWY-AaO1L6XQnli_o&s=HLv98cOqwMDLZItIQ7OpqSRQ369wFZxBqEfYgdsOtJU&e=>

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Message

From: Thomas Dow Ex. 6 Personal Privacy (PP)
Sent: 3/9/2017 3:40:33 PM
To: Samulski, Michael [samulski.michael@epa.gov]; Laroo, Chris [laroo.chris@epa.gov]
CC: Michael Kaczmarek [MKaczmarek@carnival.com]; THolm@carnival.com; Valerie Chatterley (vchatterley Ex. 6 Personal Privacy (PP)
Subject: Carnival - EPA Ann Arbor Visit

Mike and Chris,
Thank you for hosting the meeting and lab tour of your Ann Arbor facility. All of us found the discussion very helpful, and the exchange of information valuable. The tour of your test lab was most impressive.

I, for one, have a new appreciation for the scientific rigor of your work. I'm fortunate that the others in our group had enough technical background to keep up with Chris.

It was time well-spent. We are grateful that you took a half day to accommodate our visit. We look forward to following up.
Regards,

Tom Dow
Carnival Corporation

Sent from my iPad

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 4/15/2016 9:48:32 PM
To: Marine-eca [Marine-eca@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; tdow@carnival.com; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line, Carnival UK, Princess Cruises, and Holland America Line - April 2015 Interim Reports
Attachments: CCL Reporting 15 Days After Calendar Quarter April_15_2016_Bahamas.pdf; CCL Reporting 15 Days After Calendar Quarter April_15_2016_Panama.pdf; PCL Reporting 15 Days After Calendar Quarter April_15_2016.pdf; CUK Reporting 15 Days After Calendar Quarter April_15_2016.pdf; HAL Reporting 15 Days After Calendar Quarter April_15_2016_Netherlands.pdf

To Whom It May Concern,
Hope this email finds you well. Attached are the April 2015 Interim Reports regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(b).

Please let us know if we can provide you with any additional information.
Thank you for your continued support.
Sincerely,

Aubrie Brake
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 8/5/2016 7:13:12 AM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: Greuel, Justin [Greuel.Justin@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Kanzleiter, Ross (CCL) [RKanzleiter@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Sunshine IMO 9070058
Attachments: MV Carnival Sunshine EGCS Details.pdf

REF: *MV Carnival Sunshine IMO 9070058.*

Good Morning Capt. Rand,

Please see the attached document. This contains the requested information; extracted from the LR examined ETM-B manual.

Thank you very much for your time and assistance.

Regards,

Darren Davies, IEng, IMarEng, MIMarEST
Specialist, Engineering
Engineering Systems
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E darren.davies@lr.org

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Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.
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-----Original Message-----
From: Rand, Michael P CIV [mailto:Michael.P.Rand@uscg.mil]
Sent: 04 August 2016 20:14
To: Davies, Darren
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Kanzleiter, Ross (CCL); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE

Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Sunshine IMO 9070058

Dear Mr. Davies:

Thank you for submitting the documentation for the exhaust gas cleaning systems for the M/V CARNIVAL SUNSHINE.

Please provide the manufacturer, make, and engine model number for each engine onboard.

While that information is normally available on the Supplement to the IAPP, it was not there this time. Only engine number 7 is listed on the Supplement, yet three engines (1, 2, and 3) apparently received EGCSs.

I will contact you if I have questions.

r/Mike Rand

-----Original Message-----
From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Tuesday, August 02, 2016 10:30 AM
To: Rand, Michael P CIV
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Kanzleiter, Ross (CCL); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: [Non-DoD Source] USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Sunshine IMO 9070058

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installed on M/V Carnival Sunshine, IMO 9070058. Please could you acknowledge receipt of this notification.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

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See Design Appraisal Document.

Lloyd's Register

LR405.2013.12

Exhaust Gas Cleaning System
Technical Manual – Scheme B

Open-Loop Seawater DeSOx Absorption System 'ECO-DeSOx™' for MV Carnival Sunshine

This Technical Manual describes the Exhaust Gas Cleaning System Scheme B (ETM-B). It has been developed in accordance with the requirements given in the 2015 Guidelines for Exhaust Gas Cleaning Systems – MEPC-259(68) Section 5.6.1

Purchase Order number:	**1202689**
Job number:	**2015_030_APC**
Ship name:	**MV Carnival Sunshine**
IMO number:	**9070058**
System manufactured by:	**Ecospray Technologies S.r.l., Alzano Scrivia, Alessandria, Italy**
Unit model:	**ECO-DeSOx**
Ecospray project number:	**15_030_APC**

An EGC System is fitted for SOx emission control purposes to each of the DGs listed below, and each DG has a designated DeSOx Tower:

Diesel Generator number:	1	2	3
Location in ship:	**Fwd Engine Rm**	**Fwd Engine Rm**	**Fwd Engine Rm**
Engine:	**Wartsila 16ZAV40S**	**Wartsila 12ZAV40S**	**Wartsila 16ZAV40S**
MCR:	**11,520 kW**	**8,640 kW**	**11,520 kW**
Speed:	**514 rpm**	**514 rpm**	**514 rpm**
Cycle:	**4-stroke**	**4-stroke**	**4-stroke**
DG Serial number:	**1985**	**1989**	**1986**
EGC Tower number:	**15-030-APCW-0100**	**15-030-APCW-0200**	**15-030-APCW-0300**

Approved in accordance with regulation 4 of MARPOL Annex VI as an equivalent means of achieving compliance with regulation 14 of that Annex.

If amendments are necessary to the contents of this Manual, either as replacement or additional pages, these are to be approved by the Administration before implementation.

Client:	**Carnival Cruise Lines**
Revision:	**19 July 2016**

Prepared by	Checked by	Approved by
Paolo Feltri		
Paolo Feltri	**Fabio Calcagno**	**Maurizio Archetti**

Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 9/7/2016 8:04:39 AM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: Greuel, Justin [Greuel.Justin@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]; Weightman, Ian (PCL) [iweightman@hagroup.com]
Subject: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Caribbean Princess IMO 9215490
Attachments: MV Caribbean Princess EGCS Checklist.pdf; MV Caribbean Princess-EGCS LR Approval.pdf; MV Caribbean Princess-EGCS Notification Letter-USCG.pdf; MV Caribbean Princess-ETM-B extract-EGCS Serial numbers.pdf; MV Caribbean Princess-IAPP Cert.pdf; MV Caribbean Princess-ROC 2-6.pdf

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installations onboard M/V Caribbean Princess, IMO 9215490. Please could you acknowledge receipt of this notification.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST
Specialist, Engineering
Engineering Systems
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E darren.davies@lr.org

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Exhaust Gas Cleaning System Initial Survey Checklist

Ships Name	IMO Number
CARIBBEAN PRINCESS	**9215490**
Port of Registry	
Hamilton	

Notes:-

1 Mark boxes 'Yes' for complied with 'No' for not complied with or 'NA' for not applicable
2 Part 1 AA, AB and BA are to be completed for ALL initial surveys
3 Part 2 complete the items for surveying the EGCS for compliance with LR Rule requirements (Pt. 5, Ch. 24)
4 Part 3 complete for surveying the EGCS for compliance with statutory requirements (IMO Res. MEPC.259(68))

Part 1 - General

AA General

050	EGCS manufacturer	**Ecospray Technologies S.r.l.**
100	EGCS Type/Model	**ECO-DeSOx**
150	Serial Number(s)	**15025-APCW-0300, 15025-APCW-0400**
200	EGCS exhaust gas flow capacity (m^3/hr)	**90,132**
250	Engines connected to EGCS	**DG3 and DG4**
250a	Engines max power rating (kW)	**11,520**
300	Boilers connected to EGCS	**EGE3 and EGE4**
300a	Boilers max maximum steaming rate	**11.0 bar**

350	The scrubber has been approved in accordance with;	
350a	MEPC.259(68) Scheme A and SO_x emission compliance certificate sighted?	**No**
350b	MEPC.259(68) Scheme B?	**Yes**

AB National Administration Requirements

050	Have the country files been checked to ascertain any flag administration requirements?	**Yes**
100	Have all flag administration technical and reporting requirements been complied with?	**Yes**

BA Documentation – Design Approval

050	Design Appraisal Document issued and all comments closed out?	**Yes**

Part 2 - Survey of the EGCS

CA Class Requirements Survey (Part 5, Chapter 24)

Pumping and piping

050	Was the system including associated pumps, process tanks, piping and fittings examined for obvious defects and found satisfactory?	**Yes**
100	Overboard discharge is below the water line of the ship when at its minimum operating draught?	**Yes**
150	Where plastic piping has been used with bonded pipes then the pipes are joined in accordance with a procedure approved by LR and evidence of the competency of person making such bonds is available for inspection?	**Yes**
200	Deck and bulkhead penetrations inspected for good workmanship and tightness?	**Yes**
250	For open loop EGCS, arrangements are in place to protect the system if the over board discharge valve is closed and there is valve position indication at the control station?	**Yes**
300	Pipes are adequately supported?	**Yes**
350	As far as practicable, was the operation of the system confirmed? NOTE: this does not require EGCS to operate at full load or with high sulphur fuel and may be demonstrated by running pumps and systems without exhaust gas flow?	**Yes**
400	Was the operation of the overflow protection arrangement confirmed by test or simulation including alarms and interlocks?	**Yes**
450	Does the EGCS serve more than one engine?	**No**
450a	If so, an isolation valve is fitted in the exhaust gas duct before the EGCS?	**NA**
500	Is the exhaust system fitted with a by-pass for the EGCS?	**No**
500a	If so, has the by-pass valve operation and valve position indication been confirmed?	**NA**
550	When the EGCS is running, are back pressure measurements for the exhaust system available?	**Yes**
550a	Is this back pressure within the maximum permitted levels for connected combustion machinery?	**Yes**
550b	Where fitted, induced draught fans are functional and in good condition?	**NA**

** Delete as appropriate*

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	Chemical substances and wash water	
600	Does the EGCS require any chemical substances for operation?	**No**
600a	Have chemical tanks, pumps and associated piping, fittings and transfer arrangements been examined for obvious defects and operation found satisfactory?	**NA**
600b	Where applicable chemical tank coatings have been inspected and found in good condition?	**NA**
600c	Where applicable, operation of quick closing valves on chemical tanks has been tested?	**NA**
600d	Where applicable, chemical tank heating and cooling has been demonstrated to be functioning?	**NA**
600e	Chemical and water process tank high and low level protection has been tested, as applicable?	**NA**
600f	Chemical tank spill containment arrangements are in place in accordance with applicable LR Rules and in good condition?	**NA**
600g	Arrangements are in place for draining, venting, purging and making safe chemical tanks so as to permit safe maintenance and inspection?	**NA**
600h	Suitable access arrangements are in place for the EGCS and any associated tanks?	**NA**
	Electrical and control equipment	
700	Protection device settings for all outgoing electrical circuits are as per approved plans?	**Yes**
700a	EGCS emergency stop demonstrated?	**Yes**
700b	EGCS alarms and audible and visual indicators have been tested as required by the surveyor?	**Yes**
Part 3	**Statutory Survey Requirements (IMO Res. MEPC.259(68))**	
DA	**Survey – Approved Documents**	
100	Have the following plans and documents been approved by or on behalf of the Flag State with approved copies being available on-board? NOTE: it is accepted that the approved copies may be in electronic format for completion of the survey	
100a	For European flag ships, a MED certificate for the EGCS has been issued has been issued?	**NA**
100b	The Sulphur Emissions Compliance Plan (SECP)?	**Yes**
100c	The On-board Monitoring Manual (OMM)?	**Yes**
100d	The Emissions Technical Manual Scheme A or Scheme B (ETM-A or ETM-B), as applicable?	**Yes**
100e	The Exhaust Gas Cleaning (EGC) Record book as described in the OMM? NOTE: where it is proposed to use the vessels planned maintenance system to demonstrate compliance with any requirements contained within the approved documents in this section then the format of the electronic records is to be approved.	**Yes**
100f	Sulphur Emissions Compliance Certificate (SECC),(Scheme A only)?	**NA**
100g	Any manuals, instruction books or other documents which are referenced in the SECP, OMM or ETM-A or ETM-B?	**Yes**
150	The vessel's International Air Pollution Prevention certification has been updated to reference the EGCS?	**Yes**
200	Has vessel's Flag Administration been notified of EGCS installation completion and update to IAPP?	**Yes**
DB	**Scheme A Only**	
050	The required sensors, for the continuous monitoring of the parameters listed in the ETM-A, are fitted?	**NA**
050a	Records and reports of parameters can be produced in accordance with the ETM-A?	**NA**
050b	Compliance checks carried out in accordance with the instructions contained in the ETM-A?	**NA**
050c	Any spot checks of emissions included in the ETM-A have been carried out, any required sensors and equipment are installed as stipulated in the ETM-A? NOTE: where a EGCS approved in accordance with Scheme A is fitted with continuous exhaust gas emissions monitoring equipment in order to comply with regional or national regulation (e.g. the European Sulphur Directive) then the arrangements are to be surveyed in accordance with DC.	**NA**
100	Checks have been carried out to confirm that the EGCS system is in accordance with the arrangements provided in the ETM-A?	**NA**
150	Verification of EGCS compliance completed in accordance with the instructions provided in the ETM-A?	**NA**
DC	**Scheme B Only**	
050	The exhaust gas monitoring system has been demonstrated as being in working condition? NOTE: the EGCS is not required to be fully operational to demonstrate that the monitoring system is in working condition. However if the monitoring system requires the EGCS to be in operation to allow verification then the EGCS will be required to be operational	**Yes**
050a	The zero and span checks were performed as per the OMM? NOTE: manufacturer's commissioning records and calibration certificates are to be used to demonstrate that the equipment has been correctly calibrated for the application.	**Yes**
050b	Any other operating checks required by the OMM to ensure the required operation of the monitoring system have been performed? NOTE: the system check (calibration/function check without gas) is to be demonstrated.	**Yes**
100	The required sensors, for the daily spot checks of the parameters listed in the OMM, are fitted?	**Yes**
150	The data recording components and arrangements for exhaust gas monitoring are as per the OMM?	**Yes**
150a	The exhaust gas data recording system can produce the reports specified in the OMM?	**Yes**
150b	Exhaust gas emissions reports inspected and demonstrate compliance with the applicable emission limits?	**Yes**

** Delete as appropriate*

DD	Scheme A & Scheme B	
050	The combustion devices to which the EGCS is fitted are in accordance with the description given in the ETM-A or ETM-B, as applicable?	**Yes**
100	The arrangement of the EGCS and any associated equipment are as given in the ETM-A or ETM-B, as applicable?	**Yes**
100a	The EGCS washwater monitoring system components and arrangement are as per the OMM, including those applicable to the washwater additives or other substances as identified in the ETM-A or ETM-B as applicable?	**Yes**
100b	The washwater rate is in accordance with the assumed values used in determining the: a. Polycyclic Aromatic Hydrocarbons (PAH) b. Nitrate limits applicable	**Yes**
100c	The washwater monitoring system was demonstrated in working conditions? NOTE – This may be demonstrated by running various pumps associated with the system and observing the measured readings	**Yes**
100d	The zero and span checks of the washwater pH, PAH and turbidity monitors were performed as per the OMM?	**Yes**
100e	In addition, any other operating checks required by the OMM to ensure the required operation were performed?	**Yes**
100f	The arrangements are in place for the sampling and analysis of washwater nitrate content? Washwater nitrate analysis available and EGC record book updated? NOTE: If nitrate analysis is not available at the time of survey, arrangements are to be made for confirmation at a later date.	**Yes**
100g	Discharged washwater plume pH measured externally from the ship (at rest in harbour), as applicable?	**No**
100h	Wash water discharge pH has been verified by calculation or modelling as an alternative to physical measurement; details are included within the OMM?	**Yes**
200	The data recording components and arrangements for washwater are as per the OMM?	**Yes**
200a	The washwater data recording system can produce the reports specified in the OMM?	**Yes**
200b	Washwater reports inspected and demonstrate compliance with applicable emission limits?	**Yes**
300	The workmanship of the monitoring and recording system installation was satisfactory?	**Yes**
350	Was it confirmed that EGCS audible and visual alarms operate satisfactorily?	**Yes**
400	Was it confirmed that when applicable sufficient consumables for recording devices are onboard?	**Yes**
450	The procedures given in the SECP are incorporated in the ships operating procedures?	**Yes**
450a	Ship safety management system incorporates details of safe working procedures and equipment?	**Yes**

DE Remarks

Washwater nitrate analysis confirmed by Owner's representative that it will be carried out at later date.

Surveyed By

Place of Survey **Southampton**

Date of Survey **05 September 2016**

Southampton Office
Lloyd's Register EMEA

M. Fasce
Surveyor to Lloyd's Register EMEA

a member of the Lloyd's Register group.

** Delete as appropriate*

IMO Number: 9215490

APPROVED

For and on behalf of the Government of the vessel's Registration, as shown in the attached Approval History, and as complying with the Regulations stated below

EXHAUST GAS CLEANING SYSTEM (EGCS)

The information contained in the SOx Emission Compliance Plan (SECP), Onboard Monitoring Manual (OMM), EGC System Technical Manual "Scheme B" (ETM-B) and EGC Record Book have been examined for the compliance with Resolution MEPC.259 (68), Scheme 'B' (Continuous Monitoring with Parameter Checks), in accordance with Regulation 4.1 of the revised MARPOL Annex VI, which allows the use of alternative compliance methods.

No alteration or revision shall be made to any part of this plan without the prior approval of the Lloyd's Register Group.

The Owner remains responsible for the accuracy of the information and details given in OMM, ETM-B, SECP and EGC Record Book.

Signed and stamped _____ Date: 15 March 2016

Surveyor to Lloyd's Register EMEA

A Member of the Lloyd's Register Group

Approval for compliance with MARPOL Annex VI Regulation 4.1 and Resolution MEPC.259 (68), Scheme 'B' is subject to satisfactory on-board survey, which includes functional test and calibration to exhaust gas and wash water monitoring systems.

Signed and stamped _____ Date: 5 SEPTEMBER 2016

Surveyor to Lloyd's Register ...EMEA.....

A Member of The Lloyd's Register Group

Approval is subject to verification that the arrangements onboard are identical to those described in SECP, OMM and ETM-B.

Signed and stamped _____ Date: 5 SEPTEMBER 2016

Surveyor to Lloyd's Register ...EMEA.....

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IMO No. 9215490

APPROVAL HISTORY			
Original approval:			
NAME	PORT OF REGISTRY AND FLAG	OFFICIAL NO. OR CALL SIGN	SURVEYOR/DATE
CARIBBEAN PRINCESS	Hamilton Bermuda	733730 ZCDG8	MAX WU 15/3/2016
Changes:			
"CARIBBEAN PRINCESS"	HAMILTON BERMUDA	ZCDG8	MARINE DAD MRS/ENG/4279125 ISSUE No. 0 DATED 15 MARCH 2016 SEPTEMBER 2016

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WA98004, USA

PRINCESS CRUISE LINE
Corporate Headquarters
24305 Town Center Drive
Santa Clarita,
CA 91355, USA

07 Sept 2016

Re: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for M/V CARIBBEAN PRINCESS, IMO 9215490.

Ref: USCG-CVC Policy Letter 12-04 of 25 July 2012

Dear CAPT Rand,

In accordance with the requirements of Article 5.b.ii. of the reference, the following documents are attached for USCG and US EPA review of the proposed approval of the Exhaust Gas Cleaning Systems to be issued on behalf of the Government of Bermuda:

- Copy of ship's IAPP, Article 2.6 endorsement.
- Completed Lloyd's Register Surveyors Checklist for "SOX Scrubber Scheme B".

Lloyd's Register surveyors have observed the safe operation of the EGCS system onboard M/V CARIBBEAN PRINCESS. We confirm that the Onboard Monitoring Manual (OMM), EGCS Technical Manual – Scheme B (ETMB), and Sulphur Emission Control Plan (SECP) have been reviewed, accepted and stamped by Lloyd's Register. We also confirm that these documents are physically held onboard the ship, and that the manuals have been verified to accurately represent the installed EGC Systems.

We kindly request your confirmation of this submission, which will complete the approval process and use of the system inside the North American Emission Control Area (ECA) during completion of any further USCG/EPA review.

Sincerely,

Darren Davies
Lloyd's Register EMEA
Lloyd's Register

Lloyd's Register EMEA

IAN WEIGHTMAN
Princess Cruise Line TECHNICAL PROJECTS DIRECTOR

Exhaust Gas Cleaning System
Technical Manual – Scheme B

Open-Loop Seawater DeSOx Absorption System 'ECO-DeSOx™' for MV Caribbean Princess

This Technical Manual describes the Exhaust Gas Cleaning System Scheme B (ETM-B). It has been developed in accordance with the requirements given in the 2015 Guidelines for Exhaust Gas Cleaning Systems – MEPC-259(68) Section 5.6.1

Purchase Order number:	**1081748**
Job number:	**2015_25_APC**
Ship name:	**MV Caribbean Princess**
IMO number:	**9215490**
System manufactured by:	**Ecospray Technologies S.r.l., Alzano Scrivia, Alessandria, Italy**
Unit model:	**ECO-DeSOx**
Ecospray project number:	**15-025-APC**

An EGC System is fitted for SOx emission control purposes to each of the DGs listed below, and each DG has a designated DeSOx Tower:

Diesel Generator number:	**3**	**4**
Location in ship:	**Deck 1 FZ6 Stbd Inboard**	**Deck 1 FZ6 Stbd Outboard**
Engine:	**Wartsila 16VZA40S**	**Wartsila 16VZA40S**
MCR:	**11,520 kW**	**11,520 kW**
Speed:	**514 rpm**	**514 rpm**
Cycle:	**4-stroke**	**4-stroke**
DG Serial number:	**12281**	**12282**
EGC Tower number:	**15025-APCW-0300**	**15025-APCW-0400**

Approved in accordance with regulation 4 of MARPOL Annex VI as an equivalent means of achieving compliance with regulation 14 of that Annex.

If amendments are necessary to the contents of this Manual, either as replacement or additional pages, these are to be approved by the Administration before implementation.

Client:	**Princess Cruises**
Revision:	**26 February 2016**

Prepared by	Checked by	Approved by
Paolo Feltri		
Paolo Feltri	**Fabio Calcagno**	**Maurizio Archetti**

International Air Pollution Prevention Certificate

NOTE: This Certificate shall be supplemented by Record of Construction and Equipment No: **9215490/09**

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention") **under the authority of the Government of Bermuda** by Lloyd's Register EMEA.

	Particulars of Ship
Name of ship	**CARIBBEAN PRINCESS**
Distinctive number or letters	**ZCDG8**
Port of registry	**Hamilton**
Gross tonnage	**112,894**
IMO number	**9215490**

This is to certify:

1. that the ship has been surveyed in accordance with regulation 5 of Annex VI of the Convention; and

2. that the survey shows that the equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

Completion date of the survey on which this certificate is based: **01 March 2014**

This certificate is valid until **18 March 2019** subject to surveys in accordance with regulation 5 of Annex VI of the Convention.

Issued at **Southampton** on **05 September 2016**

This certificate is issued by or on behalf of **Bermuda** under the responsibility of the United Kingdom as flag state under the Convention

Southampton Office
Lloyd's Register EMEA

M. Fasce
Surveyor to Lloyd's Register EMEA

a member of the Lloyd's Register group.

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Endorsement for annual and intermediate surveys

This is to certify that at a survey required by regulation 5 of Annex VI of the Convention the ship was found to comply with the relevant provisions of that Annex:

Annual survey

Signed:
Place of survey **New York / At Sea**
Date **21 February 2015**

W. Rakowski

Annual* survey

Signed:
Place of survey **Houston, TX**
Date **14 February 2016**

J. S. Eck

Intermediate* survey

Signed:
Place of survey
Date

Annual survey

Signed:
Place of survey
Date

Annual/Intermediate survey in accordance with regulation 9.8.3

This is to certify that, at an **Annual/Intermediate*** survey in accordance with regulation 9.8.3 of Annex VI of the Convention, the ship was found to comply with the relevant provisions of that Annex:

Signed:
Place of survey
Date

* *Delete as appropriate*

Endorsement to extend the certificate if valid for less than 5 years where regulation 9.3 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.3 of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement where the renewal survey has been completed and regulation 9.4 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.4 of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 9.5 or 9.6 applies

This certificate shall, in accordance with **regulation 9(5) or 9(6)*** of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement for advancement of anniversary date where regulation 9.8 applies

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: _____
Place of survey
Date

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: _____
Place of survey
Date

** Delete as appropriate*

Record of Construction and Equipment

Supplement to the International Air Pollution Prevention Certificate (IAPP Certificate)

Notes:

1 This Record shall be permanently attached to the IAPP Certificate. The IAPP Certificate shall be available on board the ship at all times.

2 The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.

3 Entries in boxes shall be made by inserting either a cross (X) for the answer "yes" and "applicable" or a (-) for the answers "no" and "not applicable" as appropriate.

4 Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and resolutions or circulars refer to those adopted by the International Maritime Organisation.

1. Particulars of Ship:

1.1	Name of ship	**CARIBBEAN PRINCESS**
1.2	IMO number	**9215490**
1.3	Date on which keel was laid or ship was at a similar stage of construction	**31 August 2001**
1.4	Length (L)[1] metres	**Not Applicable**

2. Control of emissions from ships

2.1 Ozone depleting substances (regulation 12)

2.1.1 The following fire extinguishing systems, other systems and equipment containing ozone-depleting substances, other than hydro-chlorofluorocarbons (HCFCs), installed before 19 May 2005 may continue in service:

System or equipment	Location on board	Substance

2.1.2 The following systems containing HCFCs installed before 1 January 2020 may continue in service:

System or equipment	Location on board	Substance

[1] *Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely for recreational purposes and to which, in accordance with regulation 13.5.2.1 or regulation 13.5.2.3, the NOx emission limit as given by regulation 13.5.1.1 will not apply.*

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2.2 Nitrogen oxides (NOx) (regulation 13):

2.2.1 The following marine diesel engines installed on this ship are in accordance with the requirements of regulation 13, as indicated:

Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)			Engine #1	Engine #2	Engine #3	Engine #4	Engine #5
1	Manufacturer and model		**Wartsila Italia S.p.A. 16ZAV 40S**	**Wartsila Italia S.p.A. 16ZAV 40S**	**Wartsila Italia S.p.A. 16ZAV 40S**	**Wartsila Italia S.p.A. 16ZAV 40S**	**Wartsila Italia S.p.A. 12ZAV 40S**
2	Serial number		**12279**	**12280**	**12281**	**12282**	**12283**
3	Use (applicable application cycle(s) – NTC 3.2)		**E2**	**E2**	**E2**	**E2**	**E2**
4	Rated power (kW) (NTC 1.3.11)		**11520**	**11520**	**11520**	**11520**	**8640**
5	Rated speed (RPM) (NTC 1.3.12)		**514**	**514**	**514**	**514**	**514**
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2		**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
8b		13.2.1.2 & 13.2.3	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
8c		13.2.1.3 & 13.2.3	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
9a	Tier I	13.3	**X**	**X**	**X**	**X**	**X**
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)			Engine #6	Engine #7	Engine #8	Engine #9	Engine #10
1	Manufacturer and model		**Wartsila Italia S.p.A. 12ZAV 40S**				
2	Serial number		**12284**				
3	Use (applicable application cycle(s) – NTC 3.2)		**E2**				
4	Rated power (kW) (NTC 1.3.11)		**8640**				
5	Rated speed (RPM) (NTC 1.3.12)		**514**				
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2		**Not Applicable**				
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	**Not Applicable**				
8b		13.2.1.2 & 13.2.3	**Not Applicable**				
8c		13.2.1.3 & 13.2.3	**Not Applicable**				
9a	Tier I	13.3	**X**	--	--	--	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

	2.3	Sulphur oxides (SOx) and particulate matter (regulation 14)
	2.3.1	When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:
	2.3.1.1	fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
--		4.50% m/m (not applicable on or after 1 January 2012); or
X		3.50% m/m (not applicable on or after 1 January 2020); or
X		0.50% m/m, and/or
	2.3.1.2	an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:
--		4.50% m/m (not applicable on or after 1 January 2012); or
X		3.50% m/m (not applicable on or after 1 January 2020); or
X		0.50% m/m
	2.3.2	When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:
	2.3.2.1	fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
--		1.00% m/m (not applicable on or after 1 January 2015); or
X		0.10% m/m, and/or
	2.3.2.2	an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:
--		1.00% m/m (not applicable on or after 1 January 2015); or
X		0.10% m/m
	2.4	Volatile organic compounds (VOCs) (regulation 15)
--	2.4.1	The tanker has a vapour collection system installed and approved in accordance with MSC/Circ.585.

Approval certificate number	Approved operations manual	Approving authority	Date

--	2.4.2.1	For a tanker carrying crude oil, there is an approved VOC Management Plan
	2.4.2.2	VOC Management Plan approval reference:

Approval certificate number	Approved operations manual	Approving authority	Date

	2.5	Shipboard incineration (regulation 16)
		The ship has an incinerator:
	2.5.1	installed on or after 1 January 2000 that complies with:
X	2.5.1.1	resolution MEPC.76(40), as amended*

Manufacturer and model	Serial number	Type test certificate number
Deeberg Systems Type DS1600	**1626-Inc-1600-B**	**MED LR 0000021**

--	2.5.1.2	resolution MEPC.244(66)

Manufacturer and model	Serial number	Type test certificate number

* As amended by resolution MEPC.93(45).

2.5.2 installed before 1 January 2000 that complies with:

-- 2.5.2.1 resolution MEPC.59(33), amended**

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.2.2 resolution MEPC.76(40), amended*

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.3 installed before 1 January 2000 and which does not comply with resolution MEPC.76(40) as amended or resolution MEPC.59(33) as amended.

Manufacturer and model	Serial number	Type test certificate number

2.6 Equivalents (regulation 4)

The ship has been allowed to use the following fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to that required by this Annex:

System or equipment	Equivalent used	Approval reference	Method
Diesel Generator No. 3	**SOx Emis. reduction by EGCS**	**MTES/ENG/4279120**	**Open loop EGC System**
Diesel Generator No. 4	**SOx Emis. reduction by EGCS**	**MTES/ENG/4279120**	**Open loop EGC System**

This is to certify that this Record is correct in all respects.

Issued at **Southampton** on **05 September 2016**

Southampton Office
Lloyd's Register EMEA
Lloyd's Register

M. Fasce
Surveyor to Lloyd's Register EMEA

a member of the Lloyd's Register group.

* As amended by resolution MEPC.93(45).
** As amended by resolution MEPC.92(45).

Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 7/20/2016 3:58:56 PM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: Greuel, Justin [Greuel.Justin@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Kanzleiter, Ross (CCL) [RKanzleiter@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Miami [Miami@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Siddiqui, Nouman [Nouman.Siddiqui@lr.org]
Subject: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Valor IMO 9236389
Attachments: MV Carnival VALOR-IMO 9236389-Signed Letter of Proposal-USCG.pdf; MV Carnival VALOR-IMO9236389-EGCS Supporting Doc-USCG.pdf

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installed on M/V Carnival Valor, IMO 9236389. Please could you acknowledge receipt of this notification.

Of note, I have included the Interim Certificate for this vessel contained within the supporting documentation, which references the LR EGCS checklist items, Part 1 BA 050, and Part 2 CA. The attending surveyor noticed some issues that require resolving associated to the Classification installations, however, no restrictions on the running of the EGCS equipment concerned have been imposed. I can confirm that we (Lloyd's Register) have received the revised documentation for review from Carnival Corporation, and are currently processing the documents.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST
Specialist, Engineering
Engineering Systems
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E darren.davies@lr.org

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Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.
Visit www.lr.org

Working together for a safer world

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United States Coast Guard
USCG Headquarters
Washington, DC
US

Lloyd's Register North America Inc,
1715 114th Ave SE, Ste 120,
Bellevue,
WA98004, USA

CARNIVAL CRUISE LINES
Carnival Place
3655 NW 87th Avenue
Miami,
FL 33178, USA

Re: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for M/V CARNIVAL VALOR IMO 9236389

Ref: USCG-CVC Policy Letter 12-04 of 25 July 2012

Dear CAPT Rand;

In accordance with the requirements of Article 5.b.ii. of the Reference and our telephone call of 12 December, 2014, the following documents are attached for USCG and US EPA review of the proposed approval of the Exhaust Gas Cleaning Systems to be issued on behalf of the Government of Panama:

- Copy of ship's IAPP, Article 2.6 endorsement.
- Completed Lloyd's Register Surveyors Checklist for "SOX Scrubber Scheme B".

Lloyd's Register surveyors have observed the safe operation of the EGCS system onboard M/V Carnival VALOR. We confirm that the Onboard Monitoring Manual (OMM), EGCS Technical Manual – Scheme B (ETMB), and Sulphur Emission Control Plan (SECP) have been reviewed, accepted and stamped by Lloyd's Register. We also confirm that these documents are physically held onboard the ship, and that the manuals have been verified to accurately represent the installed EGC Systems.

We kindly request your confirmation of this submission, which will complete the approval process and use of the system inside the North American Emission Control Area (ECA) during completion of any further USCG/EPA review.

Sincerely,

Southampton ERC Office
Lloyd's Register EMEA
Lloyd's Register
Lloyd's Register EMEA

Carnival Cruise Lines

International Air Pollution Prevention Certificate
The Republic of Panama

NOTE: This Certificate shall be supplemented by Record of Construction and Equipment No: **9236389/09**

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention") under the authority of the Government of the Republic of Panama by Lloyd's Register Group Limited.

	Particulars of Ship
Name of ship	**CARNIVAL VALOR**
Distinctive number or letters	**H3VR**
Port of registry	**PANAMA**
Gross tonnage	**110,438**
IMO number	**9236389**

This is to certify:

1. that the ship has been surveyed in accordance with regulation 5 of Annex VI of the Convention; and

2. that the survey shows that the equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

Completion date of the survey on which this Certificate is based: **09 November 2014**

This certificate is valid until **30 November 2019** subject to surveys in accordance with regulation 5 of Annex VI of the Convention.

Issued at **Miami** on **01 July 2016**

Lloyd's Register North America, Inc
A. Cacho
Miami Office

A. Cacho
Surveyors to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

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Endorsement for annual and intermediate surveys

This is to certify that at a survey required by regulation 5 of Annex VI of the Convention the ship was found to comply with the relevant provisions of that Annex:

Annual survey

Signed:

Place of survey **Port Canaveral**

Date **26 December 2015**

Lloyd's Register North America, Inc.
A. Cirillo
Miami Office

for Darren Jenkins

Annual/Intermediate* survey

Signed:

Place of survey

Date

Annual/Intermediate* survey

Signed:

Place of survey

Date

Annual survey

Signed:

Place of survey

Date

Annual/Intermediate survey in accordance with regulation 9.8.3

This is to certify that, at an **Annual/Intermediate*** survey in accordance with regulation 9.8.3 of Annex VI of the Convention, the ship was found to comply with the relevant provisions of that Annex:

Signed:

Place of survey

Date

* *Delete as appropriate*

Form 2228PAN (2015.06.11)

Endorsement to extend the certificate if valid for less than 5 years where regulation 9.3 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.3 of Annex VI of the Convention, be accepted as valid until

Signed: .....
Place of survey
Date

Endorsement where the renewal survey has been completed and regulation 9.4 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.4 of Annex VI of the Convention, be accepted as valid until

Signed: .....
Place of survey
Date

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 9.5 or 9.6 applies

This certificate shall, in accordance with regulation 9(5) or 9(6)* of Annex VI of the Convention, be accepted as valid until

Signed: .....
Place of survey
Date

Endorsement for advancement of anniversary date where regulation 9.8 applies

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: .....
Place of survey
Date

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: .....
Place of survey
Date

** Delete as appropriate*

Form 2228PAN (2015.06.11)

Record of Construction and Equipment

Supplement to the International Air Pollution Prevention Certificate (IAPP Certificate)

Notes:

1 This Record shall be permanently attached to the IAPP Certificate. The IAPP Certificate shall be available on board the ship at all times.

2 The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.

3 Entries in boxes shall be made by inserting either a cross (X) for the answer "yes" and "applicable" or a (-) for the answers "no" and "not applicable" as appropriate.

4 Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and resolutions or circulars refer to those adopted by the International Maritime Organisation.

1. Particulars of Ship:

1.1	Name of ship	**CARNIVAL VALOR**
1.2	IMO number	**9236389**
1.3	Date on which keel was laid or ship was at a similar stage of construction	**26 June 2002**
1.4	Length (L)[1] metres	**Not Applicable**

2. Control of emissions from ships

2.1 Ozone depleting substances (regulation 12)

2.1.1 The following fire extinguishing systems, other systems and equipment containing ozone-depleting substances, other than hydro-chlorofluorocarbons (HCFCs), installed before 19 May 2005 may continue in service:

System or equipment	Location on board	Substance

2.1.2 The following systems containing HCFCs installed before 1 January 2020 may continue in service:

System or equipment	Location on board	Substance

[1] *Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely for recreational purposes and to which, in accordance with regulation 13.5.2.1 or regulation 13.5.2.3, the NOx emission limit as given by regulation 13.5.1.1 will not apply.*

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2.2 Nitrogen oxides (NOx) (regulation 13):

2.2.1 The following marine diesel engines installed on this ship are in accordance with the requirements of regulation 13, as indicated:

	Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)		Engine #1	Engine #2	Engine #3	Engine #4	Engine #5
1	Manufacturer and model		WARTSILA 16ZA V40S	WARTSILA 16ZA V40S	WARTSILA 16ZA V40S	WARTSILA 16ZA V40S	WARTSILA 12ZA V40S
2	Serial number		12422	12423	12424	12425	12426
3	Use (applicable application cycle(s) – NTC 3.2)		E2	E2	E2	E2	E2
4	Rated power (kW) (NTC 1.3.11)		11520	11520	11520	11520	8640
5	Rated speed (RPM) (NTC 1.3.12)		514	514	514	514	514
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2		Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
8b		13.2.1.2 & 13.2.3	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
8c		13.2.1.3 & 13.2.3	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
9a	Tier I	13.3	X	X	X	X	X
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

	Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)		Engine #6	Engine #7	Engine #8	Engine #9	Engine #10
1	Manufacturer and model		WARTSILA 12ZA V40S				
2	Serial number		12428				
3	Use (applicable application cycle(s) – NTC 3.2)		E2				
4	Rated power (kW) (NTC 1.3.11)		8640				
5	Rated speed (RPM) (NTC 1.3.12)		514				
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2		Not applicable				
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	Not applicable				
8b		13.2.1.2 & 13.2.3	Not applicable				
8c		13.2.1.3 & 13.2.3	Not applicable				
9a	Tier I	13.3	X	--	--	--	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

2.3 Sulphur oxides (SOx) and particulate matter (regulation 14)

2.3.1 When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:

2.3.1.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

-- 4.50% m/m (not applicable on or after 1 January 2012); or

X 3.50% m/m (not applicable on or after 1 January 2020); or

X 0.50% m/m, and/or

2.3.1.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:

-- 4.50% m/m (not applicable on or after 1 January 2012); or

X 3.50% m/m (not applicable on or after 1 January 2020); or

X 0.50% m/m

2.3.2 When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:

2.3.2.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

-- 1.00% m/m (not applicable on or after 1 January 2015); or

X 0.10% m/m, and/or

2.3.2.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:

-- 1.00% m/m (not applicable on or after 1 January 2015); or

X 0.10% m/m

2.4 Volatile organic compounds (VOCs) (regulation 15)

-- 2.4.1 The tanker has a vapour collection system installed and approved in accordance with MSC/Circ.585.

Approval certificate number	Approved operations manual	Approving authority	Date

-- 2.4.2.1 For a tanker carrying crude oil, there is an approved VOC Management Plan

2.4.2.2 VOC Management Plan approval reference:

Approval certificate number	Approved operations manual	Approving authority	Date

2.5 Shipboard incineration (regulation 16)

The ship has an incinerator:

2.5.1 installed on or after 1 January 2000 that complies with:

X 2.5.1.1 resolution MEPC.76(40), as amended*

Manufacturer and model	Serial number	Type test certificate number
SCANSHIP ENGINEERING A/S SE 1600	SE 147/03	DNV MED-B-965

-- 2.5.1.2 resolution MEPC.244(66)

Manufacturer and model	Serial number	Type test certificate number

* As amended by resolution MEPC.93(45).

2.5.2 installed before 1 January 2000 that complies with:

-- 2.5.2.1 resolution MEPC.59(33), amended**

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.2.2 resolution MEPC.76(40), amended*

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.3 installed before 1 January 2000 and which does not comply with resolution MEPC.76(40) as amended or resolution MEPC.59(33) as amended.

Manufacturer and model	Serial number	Type test certificate number

2.6 Equivalents (regulation 4)

The ship has been allowed to use the following fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to that required by this Annex:

System or equipment	Equivalent used	Approval reference	Method
Diesel Engine No. 4 **Diesel Engine No. 5** **Diesel Engine No. 6**	**SOx Emission Reduction by Exhuast Gas Cleaning System (MEPC 129(68) Scheme - B)**	**MTES-WP26195035** **Issue 0** **24 June 2016**	**Open Loop Exhaust Gas Cleaning System**

This is to certify that this Record is correct in all respects.

Issued at **Miami** on **01 July 2016**

Lloyd's Register North America, Inc
A. Cacho
Miami Office

A Cacho
Surveyors to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

* As amended by resolution MEPC.93(45).
** As amended by resolution MEPC.92(45).

Form 2177 (2016.02)

Exhaust Gas Cleaning System Initial Survey Checklist

Ships Name
CARNIVAL VALOR

IMO Number
9236389

Port of Registry
PANAMA

Notes:-

1 Mark boxes 'Yes' for complied with 'No' for not complied with or 'NA' for not applicable
2 Part 1 AA, AB and BA are to be completed for ALL initial surveys
3 Part 2 complete the items for surveying the EGCS for compliance with LR Rule requirements (Pt. 5, Ch. 24)
4 Part 3 complete for surveying the EGCS for compliance with statutory requirements (IMO Res. MEPC.259(68))

Part 1 - General

AA	**General**	
050	EGCS manufacturer	**ECOSPRAY TECHNOLOGIES**
100	EGCS Type/Model	**ECO-DeSOx**
150	Serial Number(s)	**15-071-APC-SC-0400, 15-071-APC-SC-0500 and 15-071-APC-SC-0600**
200	EGCS exhaust gas flow capacity (m^3/hr)	**Not Available**
250	Engines connected to EGCS	**Diesel Generators No. 4, 5 and 6**
250a	Engines max power rating (kW)	**Diesel Engine No. 5 = 8.64 MW, Diesel Engine No. 4 & 6 = 11.52 MW**
300	Boilers connected to EGCS	**Not applicable**
300a	Boilers max maximum steaming rate	**Not applicable**
350	The scrubber has been approved in accordance with;	
350a	MEPC.259(68) Scheme A and SO_x emission compliance certificate sighted?	No
350b	MEPC.259(68) Scheme B?	Yes
AB	**National Administration Requirements**	
050	Have the country files been checked to ascertain any flag administration requirements?	Yes
100	Have all flag administration technical and reporting requirements been complied with?	Yes
BA	**Documentation – Design Approval**	
050	Design Appraisal Document issued and all comments closed out?	No

Part 2 - Survey of the EGCS

CA	**Class Requirements Survey (Part 5, Chapter 24)**	
	Pumping and piping	
050	Was the system including associated pumps, process tanks, piping and fittings examined for obvious defects and found satisfactory?	Yes
100	Overboard discharge is below the water line of the ship when at its minimum operating draught?	Yes
150	Where plastic piping has been used with bonded pipes then the pipes are joined in accordance with a procedure approved by LR and evidence of the competency of person making such bonds is available for inspection?	Yes
200	Deck and bulkhead penetrations inspected for good workmanship and tightness?	Yes
250	For open loop EGCS, arrangements are in place to protect the system if the over board discharge valve is closed and there is valve position indication at the control station?	Yes
300	Pipes are adequately supported?	Yes
350	As far as practicable, was the operation of the system confirmed? NOTE: this does not require EGCS to operate at full load or with high sulphur fuel and may be demonstrated by running pumps and systems without exhaust gas flow?	Yes
400	Was the operation of the overflow protection arrangement confirmed by test or simulation including alarms and interlocks?	Yes
450	Does the EGCS serve more than one engine?	No
450a	If so, an isolation valve is fitted in the exhaust gas duct before the EGCS?	NA
500	Is the exhaust system fitted with a by-pass for the EGCS?	No
500a	If so, has the by-pass valve operation and valve position indication been confirmed?	NA
550	When the EGCS is running, are back pressure measurements for the exhaust system available?	Yes
550a	Is this back pressure within the maximum permitted levels for connected combustion machinery?	Yes
550b	Where fitted, induced draught fans are functional and in good condition?	NA

** Delete as appropriate*

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EPA-2020-000622

	Chemical substances and wash water	
600	Does the EGCS require any chemical substances for operation?	No
600a	Have chemical tanks, pumps and associated piping, fittings and transfer arrangements been examined for obvious defects and operation found satisfactory?	NA
600b	Where applicable chemical tank coatings have been inspected and found in good condition?	NA
600c	Where applicable, operation of quick closing valves on chemical tanks has been tested?	NA
600d	Where applicable, chemical tank heating and cooling has been demonstrated to be functioning?	NA
600e	Chemical and water process tank high and low level protection has been tested, as applicable?	NA
600f	Chemical tank spill containment arrangements are in place in accordance with applicable LR Rules and in good condition?	NA
600g	Arrangements are in place for draining, venting, purging and making safe chemical tanks so as to permit safe maintenance and inspection?	NA
600h	Suitable access arrangements are in place for the EGCS and any associated tanks?	NA
	Electrical and control equipment	
700	Protection device settings for all outgoing electrical circuits are as per approved plans?	Yes
700a	EGCS emergency stop demonstrated?	Yes
700b	EGCS alarms and audible and visual indicators have been tested as required by the surveyor?	Yes
Part 3	**Statutory Survey Requirements (IMO Res. MEPC.259(68))**	
DA	**Survey – Approved Documents**	
100	Have the following plans and documents been approved by or on behalf of the Flag State with approved copies being available on-board? NOTE: it is accepted that the approved copies may be in electronic format for completion of the survey	
100a	For European flag ships, a MED certificate for the EGCS has been issued has been issued?	NA
100b	The Sulphur Emissions Compliance Plan (SECP)?	Yes
100c	The On-board Monitoring Manual (OMM)?	Yes
100d	The Emissions Technical Manual Scheme A or Scheme B (ETM-A or ETM-B), as applicable?	Yes
100e	The Exhaust Gas Cleaning (EGC) Record book as described in the OMM? NOTE: where it is proposed to use the vessels planned maintenance system to demonstrate compliance with any requirements contained within the approved documents in this section then the format of the electronic records is to be approved.	Yes
100f	Sulphur Emissions Compliance Certificate (SECC),(Scheme A only)?	NA
100g	Any manuals, instruction books or other documents which are referenced in the SECP, OMM or ETM-A or ETM-B?	Yes
150	The vessel's international Air Pollution Prevention certification has been updated to reference the EGCS?	Yes
200	Has vessel's Flag Administration been notified of EGCS installation completion and update to IAPP?	Yes
DB	**Scheme A Only**	
050	The required sensors, for the continuous monitoring of the parameters listed in the ETM-A, are fitted?	NA
050a	Records and reports of parameters can be produced in accordance with the ETM-A?	NA
050b	Compliance checks carried out in accordance with the instructions contained in the ETM-A?	NA
050c	Any spot checks of emissions included in the ETM-A have been carried out, any required sensors and equipment are installed as stipulated in the ETM-A? NOTE: where a EGCS approved in accordance with Scheme A is fitted with continuous exhaust gas emissions monitoring equipment in order to comply with regional or national regulation (e.g. the European Sulphur Directive) then the arrangements are to be surveyed in accordance with DC.	NA
100	Checks have been carried out to confirm that the EGCS system is in accordance with the arrangements provided in the ETM-A?	NA
150	Verification of EGCS compliance completed in accordance with the instructions provided in the ETM-A?	NA
DC	**Scheme B Only**	
050	The exhaust gas monitoring system has been demonstrated as being in working condition? NOTE: the EGCS is not required to be fully operational to demonstrate that the monitoring system is in working condition. However if the monitoring system requires the EGCS to be in operation to allow verification then the EGCS will be required to be operational	Yes
050a	The zero and span checks were performed as per the OMM? NOTE: manufacturer's commissioning records and calibration certificates are to be used to demonstrate that the equipment has been correctly calibrated for the application.	Yes
050b	Any other operating checks required by the OMM to ensure the required operation of the monitoring system have been performed? NOTE: the system check (calibration/function check without gas) is to be demonstrated.	Yes
100	The required sensors, for the daily spot checks of the parameters listed in the OMM, are fitted?	Yes
150	The data recording components and arrangements for exhaust gas monitoring are as per the OMM?	Yes
150a	The exhaust gas data recording system can produce the reports specified in the OMM?	Yes
150b	Exhaust gas emissions reports inspected and demonstrate compliance with the applicable emission limits?	Yes

** Delete as appropriate*

ED_004159_00042617-00010

DD	Scheme A & Scheme B	
050	The combustion devices to which the EGCS is fitted are in accordance with the description given in the ETM-A or ETM-B, as applicable?	Yes
100	The arrangement of the EGCS and any associated equipment are as given in the ETM-A or ETM-B, as applicable?	Yes
100a	The EGCS washwater monitoring system components and arrangement are as per the OMM, including those applicable to the washwater additives or other substances as identified in the ETM-A or ETM-B as applicable?	Yes
100b	The washwater rate is in accordance with the assumed values used in determining the: a. Polycyclic Aromatic Hydrocarbons (PAH) b. Nitrate limits applicable	Yes
100c	The washwater monitoring system was demonstrated in working conditions? NOTE – This may be demonstrated by running various pumps associated with the system and observing the measured readings	Yes
100d	The zero and span checks of the washwater pH, PAH and turbidity monitors were performed as per the OMM?	Yes
100e	In addition, any other operating checks required by the OMM to ensure the required operation were performed?	Yes
100f	The arrangements are in place for the sampling and analysis of washwater nitrate content? Washwater nitrate analysis available and EGC record book updated? NOTE: If nitrate analysis is not available at the time of survey, arrangements are to be made for confirmation at a later date.	Yes
100g	Discharged washwater plume pH measured externally from the ship (at rest in harbour), as applicable?	NA
100h	Wash water discharge pH has been verified by calculation or modelling as an alternative to physical measurement; details are included within the OMM?	Yes
200	The data recording components and arrangements for washwater are as per the OMM?	Yes
200a	The washwater data recording system can produce the reports specified in the OMM?	Yes
200b	Washwater reports inspected and demonstrate compliance with applicable emission limits?	Yes
300	The workmanship of the monitoring and recording system installation was satisfactory?	Yes
350	Was it confirmed that EGCS audible and visual alarms operate satisfactorily?	Yes
400	Was it confirmed that when applicable sufficient consumables for recording devices are onboard?	Yes
450	The procedures given in the SECP are incorporated in the ships operating procedures?	Yes
450a	Ship safety management system incorporates details of safe working procedures and equipment?	Yes

DE Remarks

BA 050 - no evidence of Design Appraisal Provided for PID drawings. ECOSPRAY Technology Drawings CCL VALOR DG4, DG5 and DG6 No. 15-071-APC-PD-45C-R01/5SC-R01/65C-R01 found on board, these do not represent, in enterity the installation onboard.Drawing show a de-gasifier downstream the EGCS towers and a wash water treatment unti wich are not installed.
BA 050 - EGCS Towers wash water SMO piping to be shielded/insulated - see MEPC 259(68) Section 3 -
BA 050 - Additional Handrails to be fitted Engine Casing Deck 1 - see MEPC 259(68) Section 3 -
BA 050 - EGCS Tower No. 6 wash water SMO pipe run too close from grating edge at Deck 4
BA 050 - Gratings to be installed to provide access for manual operation of Sea Chest Valves
BA 100e - INFOSHIP to be updated as per described in relevant sections of OMM

Surveyed By

Place of Survey **Miami** Date of Survey **01 July 2016**

Lloyd's Register North America, Inc.
A Corp
Miami Office

Alejandro Cacho
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

** Delete as appropriate*

Form 1790 (2016.03)

INTERIM CERTIFICATE

PROVISIONAL ISSUE

Ship's Name: **CARNIVAL VALOR**
LR/IMO Number: **9236389**

Port of Survey: **Port Canaveral and at Sea**

Date of Build: **01/12/2004**
Port of Registry: **Panama**
Gross Tons: **110438**

Certificate Number: **MMI 1600565**
First Visit: **25/06/16**
Last Visit: **01/07/16**

I have carried out the surveys detailed below. All recommendations made by me have been dealt with to my satisfaction. I am recommending that class be maintained with new records as follows.

	SURVEYS HELD	STATUS	NEW RECORD
	MACHINERY		
MALT	EGCS - INSTALLATION	COMPLETE	01/07/16

CONDITIONS OF CLASS NOW IMPOSED	DUE	
EXHUAST GAS CLEANING SYSTEM (EGCS) INSTALLATION - AS BUILT PIPING AND ENGINEERING DRAWINGS TO BE SUBMITTED FOR DESIGN REVIEW IN ACCORDANCE TO LR RULES PART 5, CHAPTER 24. RECOMMENDATIONS ARISING FROM DESIGN REVIEW (DAD) TO DE DEALT WITH AS REQUIRED.	09/16	All Referenced Drawings were sent to Lloyds in Miami to process for approval. I should have an update this week.

	MEMORANDA IMPOSED	DUE
M01	EXHAUST GAS SYSTEM INSTALLATION (EGCS) THE FOLLOWING TO BE DEALT WITH:	
	BA 050 - EGCS Towers wash water SMO piping to be shielded/insulated	Done
	BA 050 - Additional Handrails to be fitted Engine Casing Deck 1	Done
	BA 050 - EGCS Tower No. 6 wash water SMO pipe run too close from grating edge at Deck 4	Done
	BA 050 - Gratings to be installed to provide access for manual operation of Sea Chest Valves	Done
	BA 450 - INFOSHIP to be updated as per described in relevant sections of OMM	Currently in the process of being updated

(contd ... 2)

The above recommendation is made subject to any outstanding conditions of class being dealt with as previously recommended.

Lloyd's Register North America, Inc
A. Cacho
Miami Office

Signed:
A. Cacho

Surveyor(s) to Lloyd's Register North America, Inc.
A member of the Lloyd's Register Group.

Date: 01/07/2016

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INTERIM CERTIFICATE

PROVISIONAL ISSUE

Ship's Name: **CARNIVAL VALOR**
LR/IMO Number: **9236389** *Certificate Number:* **MMI 1600565**

	SURVEYS HELD	STATUS	NEW RECORD
	STATUTORY SURVEYS NOW HELD		
MAM	EGCS - INSTALLATION	COMPLETE	01/07/16

*** END ***

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 3/17/2016 7:12:01 PM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]; Samulski, Michael [samulski.michael@epa.gov]; paul.topping@tc.gc.ca
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; tdow@carnival.com; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: RE: ECA Exemption program - notification regarding Carnival Liberty

Yes Sir. Thank you for your consideration.
Hope you have a great weekend.
Sincerely,

Aubrie Brake, Esq.
Manager - Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

-----Original Message-----
From: Rand, Michael P CIV [mailto:Michael.P.Rand@uscg.mil]
Sent: Thursday, March 17, 2016 3:09 PM
To: Brake, Aubrie (CarnCorp); Michael Samulski (Samulski.Michael@epamail.epa.gov) (Samulski.Michael@epamail.epa.gov); paul.topping@tc.gc.ca
Cc: Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp); Evans, Eric (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: RE: ECA Exemption program - notification regarding Carnival Liberty

Good afternoon Aubrie:

I have received your exemption notification. I will be out tomorrow and will review this next week.

r/Mike Rand

-----Original Message-----
From: Brake, Aubrie (CarnCorp) [mailto:ABrake@carnival.com]
Sent: Thursday, March 17, 2016 2:17 PM
To: Rand, Michael P CIV; Michael Samulski (Samulski.Michael@epamail.epa.gov) (Samulski.Michael@epamail.epa.gov); paul.topping@tc.gc.ca
Cc: Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp); Evans, Eric (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: [Non-DoD Source] ECA Exemption program - notification regarding Carnival Liberty

Good Afternoon CAPT Rand, Mr. Samulski, and Mr. Topping,

Hope this email finds you well.

We would like to notify you of a change in the Carnival Liberty's EGCS installation schedule. Due to recent issues with the availability of some of the ship's diesel generators, it has become necessary to delay the EGCS installation to avoid taking more engines out of service. Although this will shift the ship's ECA Exemption installation milestone dates, we are not requesting an Exemption extension. The ship is technically prepared to carry and use MGO fuel and upon its Exemption expiration on 1 September 2016 it will begin using 0.1% Sulfur MGO at all times while within the North American ECA, until its EGCS installation is complete and certified.

Attached is a formal notification letter providing additional details regarding the milestone date changes.

Please let us know if we can provide you with any additional information.

Thank you for your consideration.

Sincerely,

Aubrie Brake, Esq.

Manager - Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com <mailto:abrake@carnival.com>

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 2/8/2016 9:56:03 PM
To: Samulski, Michael [samulski.michael@epa.gov]; Rand, Michael P CIV (Michael.P.Rand@uscg.mil) [Michael.P.Rand@uscg.mil]; paul.topping@tc.gc.ca
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Brake, Aubrie (CarnCorp) [ABrake@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: FW: Request for ECA Exemption Timing Revisions
Attachments: Formal Request_Splendor and Carnival Dream.pdf

All,
Checking on progress before the next snow storm hits Washington.
Thanks for considering this request.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

From: Dow, Thomas (CarnCorp)
Sent: Thursday, January 28, 2016 2:40 PM
To: Michael Samulski (Samulski.Michael@epamail.epa.gov); Rand, Michael P CIV (Michael.P.Rand@uscg.mil); paul.topping@tc.gc.ca
Cc: Kaczmarek, Michael (CarnCorp); Brake, Aubrie (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: FW: Request for ECA Exemption Timing Revisions

All,
Following up on the email below, since some of us were snowed-out earlier in the week.
I don't expect sympathy from Paul or Mike Samulski, but things pretty much close down with 24 inches here in DC.

Hope all are well and looking forward to your consideration of this request.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

From: Dow, Thomas (CarnCorp)
Sent: Sunday, January 24, 2016 12:55 PM
To: Michael Samulski (Samulski.Michael@epamail.epa.gov); Rand, Michael P CIV (Michael.P.Rand@uscg.mil); paul.topping@tc.gc.ca
Cc: Kaczmarek, Michael (CarnCorp); Tombolesi, Emilio (CarnCorp); Brake, Aubrie (CarnCorp); Evans, Eric (CarnCorp)
Subject: Request for ECA Exemption Timing Revisions

Mike, Captain Rand, and Paul,
Attached is a request for an extension of time for the Exemption installation period for Carnival Dream. This is offset by an equal reduction in the installation period for Carnival Splendor.
This request is due to two factors:

1. Carnival plans to redeploy Splendor.
2. Carnival Dream will require additional time for the Exhaust Gas Cleaning System installation.

Paul, please note that neither ship operates in Canadian waters.

Please advise if you wish to discuss this further and we will arrange a conference call.
Thank you for considering this request.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 2/3/2016 2:45:22 PM
To: Marine-eca [Marine-eca@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Carnival Corporation - Reporting on Behalf of Carnival UK - Continuous SOx Monitoring System Report
Attachments: Queen Mary 2_Continuous SOx Monitoring System.pdf

To Whom It May Concern,
Hope this email finds you well.
Attached is the Continuous SOx Monitoring System Report for the Queen Mary 2 regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section C(7)(d).
Please let us know if we can provide you with any additional information.
Thank you for your continued support.
Sincerely,

Aubrie Brake
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 3/17/2016 6:17:07 PM
To: Rand, Michael P CIV (Michael.P.Rand@uscg.mil) [Michael.P.Rand@uscg.mil]; Samulski, Michael [samulski.michael@epa.gov]; paul.topping@tc.gc.ca
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; tdow@carnival.com; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: ECA Exemption program - notification regarding Carnival Liberty
Attachments: Formal Notification_Carnival Liberty.pdf

Good Afternoon CAPT Rand, Mr. Samulski, and Mr. Topping,
Hope this email finds you well.
We would like to notify you of a change in the Carnival Liberty's EGCS installation schedule. Due to recent issues with the availability of some of the ship's diesel generators, it has become necessary to delay the EGCS installation to avoid taking more engines out of service. Although this will shift the ship's ECA Exemption installation milestone dates, we are not requesting an Exemption extension. The ship is technically prepared to carry and use MGO fuel and upon its Exemption expiration on 1 September 2016 it will begin using 0.1% Sulfur MGO at all times while within the North American ECA, until its EGCS installation is complete and certified.

Attached is a formal notification letter providing additional details regarding the milestone date changes.

Please let us know if we can provide you with any additional information.
Thank you for your consideration.

Sincerely,
Aubrie Brake, Esq.
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

CARNIVAL
CORPORATION&PLC

17 March 2016

CAPT M. Rand
USCG

Mr. Mike Samulski
US EPA

Mr. Paul Topping
Transport Canada

Re: ECA Exemption Program, Carnival Liberty

Dear CAPT Rand, Mr. Samulski, Mr. Topping,

We would like to notify you of a change in the Carnival Liberty's Exhaust Gas Cleaning System (EGCS) installation schedule. Due to recent issues with the availability of some of the ship's diesel generators, it has become necessary to delay the EGCS installation to avoid taking more engines out of service. This will shift the ship's ECA Exemption Installation Milestone dates; however, we are not requesting an Exemption extension. The ship is technically prepared to carry and use MGO fuel and upon its Exemption expiration on 1 September 2016 it will begin using 0.1% Sulfur MGO at all times while within the North American ECA, until its EGCS installation is complete and certified.

The below milestone date changes reflect the updates necessary to ensure adequate and safe installation of the EGCSs in light of the recent equipment issues.

Milestone Date Changes:

	Installation Period Begin	**Installation Period End**	**Entry into Use**
Carnival Liberty - Original	1-Apr-2016	3-Jul-2016	1-Sep-2016
Carnival Liberty - Updated	23-Aug-2016	31-Dec-2016	1-Mar-2017

Your consideration in this matter is appreciated.
Thank you, and sincere regards,

Emilio Tombolesi
Director Environmental Policy, Carnival Corporation

Message

From: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
Sent: 1/5/2017 6:50:29 PM
To: Davies, Darren [Darren.Davies@lr.org]
CC: greuel.justin@epa.gov; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]
Subject: RE: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Vista, IMO 9692569

Dear Mr. Davies:

Thank you for amplifying information.

I will contact you if I have additional questions.

r/Mike Rand

-----Original Message-----
From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Wednesday, January 04, 2017 6:10 AM
To: Rand, Michael P CIV
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: [Non-DoD Source] RE: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Vista, IMO 9692569

Dear Capt. Rand,

Thank you for you quick reply, I have responded to your queries below.

1) "On page 5 of the Record of Construction, note 1 in the Remarks section states "EGCS DG No. 1 to be commissioned". When will it be commissioned, and will the IAPP be updated when it is?"

I have contacted Carnival Corporation, and they intend to begin the commissioning of DG1 in the next month or so. Yes, in order for DG1 to be recognised as having a compliant EGCS for operation within ECA, it will need to be witnessed as running within the specified international limits, and recorded correctly for certification. Therefore the documentation associated to this will need to be amended and updated to reflect the additional compliant DG if all goes well during commissioning.

2) "On page 1 (of 3) of the EGCS Initial Survey Checklist, a handwritten note states the EGCS gas flow mass capacity is 100,900 and 60,200, yet the ETM-B states 118,800 and 70,800. Which is correct?"

Contained in the ETM-B are two values for the exhaust gas flow rate, one for 100% MCR on page 4, and the second is for 85% MCR on page 20. I have extracted both of these values and displayed them below. Both these values were contained in the attached supporting document sent to you in my earlier e-mail, and attached to this e-mail again for reassurance.

From page 4 of ETM-B:

From page 20 of ETM-B:

I trust the above information is sufficient to answer your queries, and as mentioned, we will be in contact soon with more details on the updated configurations of operating EGCS on Carnival Vista.

In summary, Carnival Vista's DG2 and DG5 have been demonstrated as having fully operational EGCS equipment in accordance with MEPC 259(68). DG1's EGCS remains to be commissioned in the coming months.

Best Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XxmT1-5mnr-hf89f6U5tAarEiN5J59F5tjuLkrCl2-A&m=y3OVdWVC_lV08k18q7KPLYnJfFVBW7_GqYsQ0785U_c&s=FNkBUyAgrhwVbkTzGkETqGJhXW-C7oO6bjMpqQnxFGY&e=>

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-----Original Message-----
From: Rand, Michael P CIV [mailto:Michael.P.Rand@uscg.mil]
Sent: 03 January 2017 14:47
To: Davies, Darren
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: RE: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Vista, IMO 9692569

Dear Mr. Davies:

Thank you for the reminder. I apologize for the delay in responding.

Thank you for submitting the documentation for the exhaust gas cleaning systems for the M/V CARNIVAL VISTA.

I have two questions.

On page 5 of the Record of Construction, note 1 in the Remarks section states "EGCS DG No. 1 to be commissioned". When will it be commissioned, and will the IAPP be updated when it is?

On page 1 (of 3) of the EGCS Initial Survey Checklist, a handwritten note states the EGCS gas flow mass capacity is 100,900 and 60,200, yet the ETM-B states 118,800 and 70,800. Which is correct?

I will contact you if I have additional questions.

Thank you.

r/Mike Rand

-----Original Message-----

From: Davies, Darren [mailto:Darren.Davies@lr.org <mailto:Darren.Davies@lr.org>]

Sent: Tuesday, January 03, 2017 8:42 AM

To: Rand, Michael P CIV

Cc: greuel.justin@epa.gov <mailto:greuel.justin@epa.gov> ; samulski.michael@epa.gov <mailto:samulski.michael@epa.gov> ; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE

Subject: [Non-DoD Source] FW: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Vista, IMO 9692569

Dear Capt. Rand,

With reference to my e-mail dated 08-Dec-2016 below, I understand that this may have been sent during your vacation period, and therefore wish to ask whether this has been received by yourselves. As you can appreciate, the operating company are keen to have the acknowledgment from USCG due to restrictions on operating the vessel within the ECA areas.

Your response is much appreciated. If further documentation is required to satisfy generated queries, please let me know.

Best Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XxmT1-5mnr-hf89f6U5tAarEiN5J59F5tjuLkrCl2-A&m=y30VdWVC_lVO8k18q7KPLYnJfFVBW7_GqYsQ0785U_c&s=Ci4OEfFYOT43vzyH2sGUORUlBPJMGKaXPZ4oz6xI8as&e=> <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=6AJpfAhfrtAx9lYhiKt5Xp_8dSYDTL8ILWPhc6_8H8Q&s=VWfmgcmkqHh5Q6i2e3bHILRXyG5EtRZ9trQ864VB7H8&e= <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=6AJpfAhfrtAx9lYhiKt5Xp_8dSYDTL8ILWPhc6_8H8Q&s=VWfmgcmkqHh5Q6i2e3bHILRXyG5EtRZ9trQ864VB7H8&e=> >

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From: Davies, Darren

Sent: 08 December 2016 15:34

To: 'Rand, Michael P CIV'

Cc: 'greuel.justin@epa.gov'; 'samulski.michael@epa.gov'; 'HQS-PF-fldr-ECA-Foreign'; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); 'Santiesteban, Marilyn (CarnCorp)'; MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE

Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Vista, IMO 9692569

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installations on board M/V Carnival Vista, IMO 9692569. Please could you acknowledge receipt of this notification e-mail.

I have included the vessel's Interim Certificate issued by LR on this occasion, which reflects the current situation with respect to the EGCS systems on board the Carnival Vista. As can be seen from LR's surveyor comments on both the interim certificate and the LR EGCS initial checklist, some amendments are required in the ETM-B. I can confirm that LR are in receipt of the amended ETM-B manual, and we are currently in correspondence with Carnival Corporation with respect to the changes requested.

To conclude, Carnival Vista currently has two (2) fully operational independent EGCS fitted. One for DG2, and another for DG5. EGCS for DG1 is not currently operational. Data and serial numbers for these units are also attached for your reference.

I trust the above is acceptable, and we will be in touch with further updates with respect to DG1 in due course. If you require any further information to be provided, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems & MARPOL Department

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XxmT1-5mnr-hf89f6U5tAarEiN5J59F5tjuLkrCl2-A&m=y30VdWVC_lVO8k18q7KPLYnJfFVBW7_GqYsQ0785U_c&s=Ci4OEfFYOT43vzyH2sGU0RUlBPJMGKaXPZ4oz6xI8as&e=> <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=6AJpfAhfrtAx9lYhiKt5Xp_8dSYDTL8ILWPhc6_8H8Q&s=VWfmgcmkqHh5Q6i2e3bHILRXyG5EtRZ9trQ864VB7H8&e= <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=6AJpfAhfrtAx9lYhiKt5Xp_8dSYDTL8ILWPhc6_8H8Q&s=VWfmgcmkqHh5Q6i2e3bHILRXyG5EtRZ9trQ864VB7H8&e=> >

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Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 1/4/2017 11:09:40 AM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: greuel.justin@epa.gov; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]
Subject: RE: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Vista, IMO 9692569
Attachments: MV Carnival Vista-IMO 9692569-EGCS Serial No Data-USCG.PDF

Dear Capt. Rand,

Thank you for you quick reply, I have responded to your queries below.

1) *"On page 5 of the Record of Construction, note 1 in the Remarks section states "EGCS DG No. 1 to be commissioned". When will it be commissioned, and will the IAPP be updated when it is?"*
I have contacted Carnival Corporation, and they intend to begin the commissioning of DG1 in the next month or so. Yes, in order for DG1 to be recognised as having a compliant EGCS for operation within ECA, it will need to be witnessed as running within the specified international limits, and recorded correctly for certification. Therefore the documentation associated to this will need to be amended and updated to reflect the additional compliant DG if all goes well during commissioning.

2) *"On page 1 (of 3) of the EGCS Initial Survey Checklist, a handwritten note states the EGCS gas flow mass capacity is 100,900 and 60,200, yet the ETM-B states 118,800 and 70,800. Which is correct?"*
Contained in the ETM-B are two values for the exhaust gas flow rate, one for 100% MCR on page 4, and the second is for 85% MCR on page 20. I have extracted both of these values and displayed them below. Both these values were contained in the attached supporting document sent to you in my earlier e-mail, and attached to this e-mail again for reassurance.

From page 4 of ETM-B:

Exhaust gas flow rate [kg/h] at full load (100% MCR)	118,800	118,800	70,800

From page 20 of ETM-B:

Exhaust gas mass flow rate [kg/h] (**Note:** Max. value corresponds to 85% MCR)	Min	[nac]	[nac]
	Max	100,900	60,200

I trust the above information is sufficient to answer your queries, and as mentioned, we will be in contact soon with more details on the updated configurations of operating EGCS on Carnival Vista.

In summary, Carnival Vista's DG2 and DG5 have been demonstrated as having fully operational EGCS equipment in accordance with MEPC 259(68). DG1's EGCS remains to be commissioned in the coming months.

Best Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering
Engineering Systems
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

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-----Original Message-----
From: Rand, Michael P CIV [mailto:Michael.P.Rand@uscg.mil]
Sent: 03 January 2017 14:47
To: Davies, Darren
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: RE: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Vista, IMO 9692569

Dear Mr. Davies:

Thank you for the reminder. I apologize for the delay in responding.

Thank you for submitting the documentation for the exhaust gas cleaning systems for the M/V CARNIVAL VISTA.

I have two questions.

On page 5 of the Record of Construction, note 1 in the Remarks section states "EGCS DG No. 1 to be commissioned". When will it be commissioned, and will the IAPP be updated when it is?

On page 1 (of 3) of the EGCS Initial Survey Checklist, a handwritten note states the EGCS gas flow mass capacity is 100,900 and 60,200, yet the ETM-B states 118,800 and 70,800. Which is correct?

I will contact you if I have additional questions.

Thank you.

r/Mike Rand

-----Original Message-----
From: Davies, Darren [mailto:Darren.Davies@lr.org]

Sent: Tuesday, January 03, 2017 8:42 AM
To: Rand, Michael P CIV
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: [Non-DoD Source] FW: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Vista, IMO 9692569

Dear Capt. Rand,

With reference to my e-mail dated 08-Dec-2016 below, I understand that this may have been sent during your vacation period, and therefore wish to ask whether this has been received by yourselves. As you can appreciate, the operating company are keen to have the acknowledgment from USCG due to restrictions on operating the vessel within the ECA areas.

Your response is much appreciated. If further documentation is required to satisfy generated queries, please let me know.

Best Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=6AJpfAhfrtAx9lYhiKt5Xp_8dSYDTL8ILWPhc6_8H8Q&s=VWfmgcmkqHh5Q6i2e3bHILRXyG5EtRZ9trQ864VB7H8&e=>

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From: Davies, Darren
Sent: 08 December 2016 15:34
To: 'Rand, Michael P CIV'
Cc: 'greuel.justin@epa.gov'; 'samulski.michael@epa.gov'; 'HQS-PF-fldr-ECA-Foreign'; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); 'Santiesteban, Marilyn (CarnCorp)'; MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Vista, IMO 9692569

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installations on board M/V Carnival Vista, IMO 9692569. Please could you acknowledge receipt of this notification e-mail.

I have included the vessel's Interim Certificate issued by LR on this occasion, which reflects the current situation with respect to the EGCS systems on board the Carnival Vista. As can be seen from LR's surveyor comments on both the interim certificate and the LR EGCS initial checklist, some amendments are required in the ETM-B. I can confirm that LR are in receipt of the amended ETM-B manual, and we are currently in correspondence with Carnival Corporation with respect to the changes requested.

To conclude, Carnival Vista currently has two (2) fully operational independent EGCS fitted. One for DG2, and another for DG5. EGCS for DG1 is not currently operational. Data and serial numbers for these units are also attached for your reference.

I trust the above is acceptable, and we will be in touch with further updates with respect to DG1 in due course. If you require any further information to be provided, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems & MARPOL Department

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=6AJpfAhfrtAx9lYhiKt5Xp_8dSYDTL8ILWPhc6_8H8Q&s=VWfmgcmkqHh5Q6i2e3bHILRXyG5EtRZ9trQ864VB7H8&e=>

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Message

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 9/14/2017 2:42:50 PM
To: Samulski, Michael [samulski.michael@epa.gov]
CC: Laroo, Chris [laroo.chris@epa.gov]; Valerie Chatterley [Ex. 6 Personal Privacy (PP)] 2tomdow[Ex. 6 Personal Privacy (PP)]; Storari, Renato (CarnCorp) [RStorari@carnival.com]
Subject: Re: Crown Princess Exhaust Gas Testing Final Report, by Wartsila Tech Services

Ok, thanks Mike, and we look forward to receiving your comments.
Regards,
Mike

Sent from my iPhone

> On Sep 14, 2017, at 4:36 PM, Samulski, Michael <samulski.michael@epa.gov> wrote:
>
> Thanks Mike. Chris and I will review the report and let you know, one way or the other, if we have any feedback. Chris is offsite today, so it may be a few days before we get back to you.
>
> Best regards,
>
> Mike.
>
> **********
> Michael Samulski
> U.S. Environmental Protection Agency
> Office of Transportation and Air Quality
> Director, Large Marine and Aircraft Center
> 1 (734) 214-4532
> samulski.michael@epa.gov
> **********
>
> -----Original Message-----
> From: Kaczmarek, Michael (CarnCorp) [mailto:MKaczmarek@carnival.com]
> Sent: Thursday, September 14, 2017 8:34 AM
> To: Samulski, Michael <samulski.michael@epa.gov>
> Cc: Laroo, Chris <laroo.chris@epa.gov>; Valerie Chatterley [Ex. 6 Personal Privacy (PP)] [Ex. 6 Personal Privacy (PP)] 2tomdow[Ex. 6 Personal Privacy (PP)]; Storari, Renato (CarnCorp) <RStorari@carnival.com>
> Subject: Fwd: Crown Princess Exhaust Gas Testing Final Report, by Wartsila Tech Services
>
> Dear Mike;
> Regret the long delay but we believe we are now on the right track and submit the attached report from testing on Crown Princess.
>
> The results are a little short of what we have experienced in other recent testing on a non-ECA-Exempt ship, but we believe this is due largely to the fact that Crown Princess is a common-rail ship which already has a low smoke signature.
>
> With your confirmation that the attachment is acceptable we will immediately start booking subsequent tests on other ships, as agreed.
>
> Thanks and best regards,
> Mike
>
>
> Begin forwarded message:
>
> From: "Deltreppo, Massimiliano" <massimiliano.deltreppo@wartsila.com<mailto:massimiliano.deltreppo@wartsila.com>>
> To: "Kaczmarek, Michael (CarnCorp)" <MKaczmarek@carnival.com<mailto:MKaczmarek@carnival.com>>
> Cc: "Storari, Renato (CarnCorp)" <RStorari@carnival.com<mailto:RStorari@carnival.com>>, "Valerie Chatterley [Ex. 6 Personal Privacy (PP)]" [redacted], "Gremese, Cesare" <Cesare.Gremese@wartsila.com<mailto:Cesare.Gremese@wartsila.com>>, "Sundell, Tom" <tom.sundell@wartsila.com<mailto:tom.sundell@wartsila.com>>, "Tuuf, Jean-Christoffer" <jean-christoffer.tuuf@wartsila.com<mailto:jean-christoffer.tuuf@wartsila.com>>, "Vestergren, Andreas" <andreas.vestergren@wartsila.com<mailto:andreas.vestergren@wartsila.com>>
> Subject: RE: Crown Princess Exhaust Gas Testing Final Report, by Wartsila Tech Services
>
> Dear Mike,

>
> Good day,
> Please find attached the revised report with below changes implemented as requested and signed.
>
> Let us know if report is ok for EPA submission.
>
> Available to discuss further,
>
> Thanks,
> Kr
> Max
>
>
> [cid:image001.png@01D3271B.15B80CA0]
>

Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 9/2/2016 12:37:36 PM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: Greuel, Justin [Greuel.Justin@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]
Subject: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Oosterdam IMO 9221281
Attachments: MV Oosterdam IMO 9221281-Letter of Proposal-USCG.pdf; MV Oosterdam-EGCS Supporting Document-USCG.pdf; MV Oosterdam-ETM-B page-EGCS Serial Numbers.pdf

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installations onboard M/V Oosterdam, IMO 9221281. Please could you acknowledge receipt of this notification.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST
Specialist, Engineering
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USCG Headquarters
Washington, DC
US

Lloyd's Register North America Inc,
1715 114th Ave SE, Ste 120,
Bellevue,
WA98004, USA

HOLLAND AMERICA LINE
300 Elliott Avenue West
Seattle,
WA 98119, USA

Re: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for M/V OOSTERDAM IMO 9221281

Ref: USCG-CVC Policy Letter 12-04 of 25 July 2012

Dear CAPT Rand;

In accordance with the requirements of Article 5.b.ii. of the Reference and our telephone call of 12 December, 2014, the following documents are attached for USCG and US EPA review of the proposed approval of the Exhaust Gas Cleaning Systems to be issued on behalf of the Government of Netherlands:

- Copy of ship's IAPP, Article 2.6 endorsement.
- Completed Lloyd's Register Surveyors Checklist for "SOX Scrubber Scheme B".

Lloyd's Register surveyors have observed the safe operation of the EGCS system onboard M/V OOSTERDAM. We confirm that the Onboard Monitoring Manual (OMM), EGCS Technical Manual – Scheme B (ETMB), and Sulphur Emission Control Plan (SECP) have been reviewed, accepted and stamped by Lloyd's Register. We also confirm that these documents are physically held onboard the ship, and that the manuals have been verified to accurately represent the installed EGC Systems.

We kindly request your confirmation of this submission, which will complete the approval process and use of the system inside the North American Emission Control Area (ECA) during completion of any further USCG/EPA review.

Sincerely,

Darren Davies
Lloyd's Register EMEA
Lloyd's Register

LR627 2013-12

Lloyd's Register

Holland America Line
S.C. DORR

This certificate replaces the IAPP Cert. MSL 1600268 issued on 28 August 2016 Which is now cancelled.

Certificate no: **MSL 1600268/A1**
Page 1 of 3

International Air Pollution Prevention Certificate

NOTE: This Certificate shall be supplemented by Record of Construction and Equipment No: **9221281/11**

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention") **under the authority of the Government of the Netherlands** by Lloyd's Register EMEA

.

	Particulars of Ship
Name of ship	**OOSTERDAM**
Distinctive number or letters	**PBKH**
Port of registry	**ROTTERDAM**
Gross tonnage	**82,305**
IMO number	**9221281**

This is to certify:

1. that the ship has been surveyed in accordance with regulation 5 of Annex VI of the Convention; and

2. that the survey shows that the equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

Completion date of the survey on which this certificate is based: **23 June 2013**

This certificate is valid until **10 July 2018** subject to surveys in accordance with regulation 5 of Annex VI of the Convention.

Issued at **Marseille** on **02 September 2016**

Marseille Office
Lloyd's Register EMEA
Lloyd's Register

Arnaud LE GALL
Surveyor to Lloyd's Register EMEA

a member of the Lloyd's Register group.

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Form 2228 (2015.06)

Endorsement for annual and intermediate surveys

This is to certify that at a survey required by regulation 5 of Annex VI of the Convention the ship was found to comply with the relevant provisions of that Annex:

Annual survey

Signed: Marseille Office Lloyd's Register EMEA

Place of survey **VANCOUVER B.C.**

Date **06 July 2014**

A. LE GALL on behalf of T.D. KAMPERT

Annual* survey

Signed: Marseille Office Lloyd's Register EMEA

Place of survey **SEATTLE WA.**

Date **28 June 2015**

A. LE GALL on behalf of L. ZHANG

Intermediate* survey

Signed: Marseille Office Lloyd's Register EMEA

Place of survey **MYKONOS**

Date **24 June 2016**

A. LE GALL on behalf of A. PANARELLO

Annual survey

Signed:

Place of survey

Date

Annual/Intermediate survey in accordance with regulation 9.8.3

This is to certify that, at an **Annual/Intermediate*** survey in accordance with regulation 9.8.3 of Annex VI of the Convention, the ship was found to comply with the relevant provisions of that Annex:

Signed:

Place of survey

Date

* *Delete as appropriate*

Endorsement to extend the certificate if valid for less than 5 years where regulation 9.3 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.3 of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement where the renewal survey has been completed and regulation 9.4 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.4 of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 9.5 or 9.6 applies

This certificate shall, in accordance with **regulation 9(5) or 9(6)*** of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement for advancement of anniversary date where regulation 9.8 applies

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: _____
Place of survey
Date

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: _____
Place of survey
Date

** Delete as appropriate*

Record of Construction and Equipment

Supplement to the International Air Pollution Prevention Certificate (IAPP Certificate)

Notes:

1 This Record shall be permanently attached to the IAPP Certificate. The IAPP Certificate shall be available on board the ship at all times.

2 The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.

3 Entries in boxes shall be made by inserting either a cross (X) for the answer "yes" and "applicable" or a (-) for the answers "no" and "not applicable" as appropriate.

4 Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and resolutions or circulars refer to those adopted by the International Maritime Organisation.

1. Particulars of Ship:

1.1	Name of ship	**Oosterdam**
1.2	IMO number	**9221281**
1.3	Date on which keel was laid or ship was at a similar stage of construction	**16 January 2002**
1.4	Length (L)[1] metres	**Not Applicable**

2. Control of emissions from ships

2.1 Ozone depleting substances (regulation 12)

2.1.1 The following fire extinguishing systems, other systems and equipment containing ozone-depleting substances, other than hydro-chlorofluorocarbons (HCFCs), installed before 19 May 2005 may continue in service:

System or equipment	Location on board	Substance

2.1.2 The following systems containing HCFCs installed before 1 January 2020 may continue in service:

System or equipment	Location on board	Substance

[1] *Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely for recreational purposes and to which, in accordance with regulation 13.5.2.1 or regulation 13.5.2.3, the NOx emission limit as given by regulation 13.5.1.1 will not apply.*

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2.2 Nitrogen oxides (NOx) (regulation 13):

2.2.1 The following marine diesel engines installed on this ship are in accordance with the requirements of regulation 13, as indicated:

Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)			Engine #1	Engine #2	Engine #3	Engine #4	Engine #5
1	Manufacturer and model		**Wartsila 16ZAV40S**	**Wartsila 12ZAV40S**	**Wartsila 16ZAV40S**	**Wartsila 16ZAV40S**	**Wartsila 12ZAV40S**
2	Serial number		**12338**	**12341**	**12337**	**12339**	**12340**
3	Use (applicable application cycle(s) – NTC 3.2)		**Test Cycle E2**	**Test Cycle E2**	**Test Cycle E2**	**Test Cycle E2**	**Test Cycle E2**
4	Rated power (kW) (NTC 1.3.11)		**11520**	**8640**	**11520**	**11520**	**8640**
5	Rated speed (RPM) (NTC 1.3.12)		**514**	**514**	**514**	**514**	**514**
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2						
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
8b		13.2.1.2 & 13.2.3					
8c		13.2.1.3 & 13.2.3					
9a	Tier I	13.3	**X**	**X**	**X**	**X**	**X**
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)			Engine #6	Engine #7	Engine #8	Engine #9	Engine #10
1	Manufacturer and model						
2	Serial number						
3	Use (applicable application cycle(s) – NTC 3.2)						
4	Rated power (kW) (NTC 1.3.11)						
5	Rated speed (RPM) (NTC 1.3.12)						
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2						
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2					
8b		13.2.1.2 & 13.2.3					
8c		13.2.1.3 & 13.2.3					
9a	Tier I	13.3	--	--	--	--	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

	2.3	Sulphur oxides (SOx) and particulate matter (regulation 14)
	2.3.1	When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:
	2.3.1.1	fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
--		4.50% m/m (not applicable on or after 1 January 2012); or
X		3.50% m/m (not applicable on or after 1 January 2020); or
X		0.50% m/m, and/or
	2.3.1.2	an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:
--		4.50% m/m (not applicable on or after 1 January 2012); or
X		3.50% m/m (not applicable on or after 1 January 2020); or
X		0.50% m/m
	2.3.2	When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:
	2.3.2.1	fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
--		1.00% m/m (not applicable on or after 1 January 2015); or
X		0.10% m/m, and/or
	2.3.2.2	an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:
--		1.00% m/m (not applicable on or after 1 January 2015); or
X		0.10% m/m
	2.4	Volatile organic compounds (VOCs) (regulation 15)
--	2.4.1	The tanker has a vapour collection system installed and approved in accordance with MSC/Circ.585.

Approval certificate number	Approved operations manual	Approving authority	Date

--	2.4.2.1	For a tanker carrying crude oil, there is an approved VOC Management Plan
	2.4.2.2	VOC Management Plan approval reference:

Approval certificate number	Approved operations manual	Approving authority	Date

	2.5	Shipboard incineration (regulation 16)
		The ship has an incinerator:
	2.5.1	installed on or after 1 January 2000 that complies with:
X	2.5.1.1	resolution MEPC.76(40), as amended*

Manufacturer and model	Serial number	Type test certificate number
Scanship Engineering AS, Tonberg, Norway Type 1400S	**SE132/01**	**MED - B - 3875**

--	2.5.1.2	resolution MEPC.244(66)

Manufacturer and model	Serial number	Type test certificate number

* As amended by resolution MEPC.93(45).

2.5.2 installed before 1 January 2000 that complies with:

-- 2.5.2.1 resolution MEPC.59(33), amended**

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.2.2 resolution MEPC.76(40), amended*

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.3 installed before 1 January 2000 and which does not comply with resolution MEPC.76(40) as amended or resolution MEPC.59(33) as amended.

Manufacturer and model	Serial number	Type test certificate number

2.6 Equivalents (regulation 4)

The ship has been allowed to use the following fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to that required by this Annex:

System or equipment	Equivalent used	Approval reference	Method
Engine No 1 (Aft Port)	**EGCS**	**MTES-WP25836363**	**Open-Loop Exhaust Gas Cleaning**
Engine No 2 (Aft Centre)	**EGCS**	**MTES-WP25836363**	**Open-Loop Exhaust Gas Cleaning**
Engine No 4 (Forward Port)	**EGCS**	**MTES-WP25836363**	**Open-Loop Exhaust Gas Cleaning**

This is to certify that this Record is correct in all respects.

Issued at **Marseille** on **02 September 2016**

Marseille Office
Lloyd's Register EMEA
Lloyd's Register

Arnaud LE GALL
Surveyor to Lloyd's Register EMEA

a member of the Lloyd's Register group.

* As amended by resolution MEPC.93(45).
** As amended by resolution MEPC.92(45).

Exhaust Gas Cleaning System Initial Survey Checklist

Ships Name	IMO Number
OOSTERDAM	**9221281**
Port of Registry	
ROTTERDAM	

Notes:-

1 Mark boxes 'Yes' for complied with 'No' for not complied with or 'NA' for not applicable
2 Part 1 AA, AB and BA are to be completed for ALL initial surveys
3 Part 2 complete the items for surveying the EGCS for compliance with LR Rule requirements (Pt. 5, Ch. 24)
4 Part 3 complete for surveying the EGCS for compliance with statutory requirements (IMO Res. MEPC.259(68))

Part 1 - General

AA General

050	EGCS manufacturer	**ECOSPRAY Technologies S.r.l.**
100	EGCS Type/Model	**Single stream open loop sea water EGCS - Model ECO-deSOx**
150	Serial Number(s)	**Drawings 14-071-APCW-0001/2/3-R03-P&ID 03 , Towers 15-040-APC-SC-010/0200/0400**
200	EGCS exhaust gas flow capacity (m^3/hr)	**2 x 90.133 , 1 x 67.599**
250	Engines connected to EGCS	**N1 , N2 , N3**
250a	Engines max power rating (kW)	**2 x 11.5 MW (16 cyl), 1 x 8.6 MW (12 Cyl)**
300	Boilers connected to EGCS	**N/A**
300a	Boilers max maximum steaming rate	**N/A**
350	The scrubber has been approved in accordance with;	
350a	MEPC.259(68) Scheme A and SO_x emission compliance certificate sighted?	**No**
350b	MEPC.259(68) Scheme B?	**Yes**

AB National Administration Requirements

050	Have the country files been checked to ascertain any flag administration requirements?	**Yes**
100	Have all flag administration technical and reporting requirements been complied with?	**Yes**

BA Documentation – Design Approval

050	Design Appraisal Document issued and all comments closed out?	**Yes**

Part 2 - Survey of the EGCS

CA Class Requirements Survey (Part 5, Chapter 24)

Pumping and piping

050	Was the system including associated pumps, process tanks, piping and fittings examined for obvious defects and found satisfactory?	**Yes**
100	Overboard discharge is below the water line of the ship when at its minimum operating draught?	**Yes**
150	Where plastic piping has been used with bonded pipes then the pipes are joined in accordance with a procedure approved by LR and evidence of the competency of person making such bonds is available for inspection?	**Yes**
200	Deck and bulkhead penetrations inspected for good workmanship and tightness?	**Yes**
250	For open loop EGCS, arrangements are in place to protect the system if the over board discharge valve is closed and there is valve position indication at the control station?	**Yes**
300	Pipes are adequately supported?	**Yes**
350	As far as practicable, was the operation of the system confirmed? NOTE: this does not require EGCS to operate at full load or with high sulphur fuel and may be demonstrated by running pumps and systems without exhaust gas flow?	**Yes**
400	Was the operation of the overflow protection arrangement confirmed by test or simulation including alarms and interlocks?	**Yes**
450	Does the EGCS serve more than one engine?	**No**
450a	If so, an isolation valve is fitted in the exhaust gas duct before the EGCS?	**NA**
500	Is the exhaust system fitted with a by-pass for the EGCS?	**No**
500a	If so, has the by-pass valve operation and valve position indication been confirmed?	**NA**
550	When the EGCS is running, are back pressure measurements for the exhaust system available?	**Yes**
550a	Is this back pressure within the maximum permitted levels for connected combustion machinery?	**Yes**
550b	Where fitted, induced draught fans are functional and in good condition?	**NA**

** Delete as appropriate*

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	Chemical substances and wash water	
600	Does the EGCS require any chemical substances for operation?	No
600a	Have chemical tanks, pumps and associated piping, fittings and transfer arrangements been examined for obvious defects and operation found satisfactory?	NA
600b	Where applicable chemical tank coatings have been inspected and found in good condition?	NA
600c	Where applicable, operation of quick closing valves on chemical tanks has been tested?	NA
600d	Where applicable, chemical tank heating and cooling has been demonstrated to be functioning?	NA
600e	Chemical and water process tank high and low level protection has been tested, as applicable?	NA
600f	Chemical tank spill containment arrangements are in place in accordance with applicable LR Rules and in good condition?	NA
600g	Arrangements are in place for draining, venting, purging and making safe chemical tanks so as to permit safe maintenance and inspection?	NA
600h	Suitable access arrangements are in place for the EGCS and any associated tanks?	NA
	Electrical and control equipment	
700	Protection device settings for all outgoing electrical circuits are as per approved plans?	Yes
700a	EGCS emergency stop demonstrated?	Yes
700b	EGCS alarms and audible and visual indicators have been tested as required by the surveyor?	Yes
Part 3	**Statutory Survey Requirements (IMO Res. MEPC.259(68))**	
DA	**Survey – Approved Documents**	
100	Have the following plans and documents been approved by or on behalf of the Flag State with approved copies being available on-board? NOTE: it is accepted that the approved copies may be in electronic format for completion of the survey	
100a	For European flag ships, a MED certificate for the EGCS has been issued has been issued?	Yes
100b	The Sulphur Emissions Compliance Plan (SECP)?	Yes
100c	The On-board Monitoring Manual (OMM)?	Yes
100d	The Emissions Technical Manual Scheme A or Scheme B (ETM-A or ETM-B), as applicable?	Yes
100e	The Exhaust Gas Cleaning (EGC) Record book as described in the OMM? NOTE: where it is proposed to use the vessels planned maintenance system to demonstrate compliance with any requirements contained within the approved documents in this section then the format of the electronic records is to be approved.	Yes
100f	Sulphur Emissions Compliance Certificate (SECC),(Scheme A only)?	NA
100g	Any manuals, instruction books or other documents which are referenced in the SECP, OMM or ETM-A or ETM-B?	Yes
150	The vessel's International Air Pollution Prevention certification has been updated to reference the EGCS?	Yes
200	Has vessel's Flag Administration been notified of EGCS installation completion and update to IAPP?	Yes
DB	**Scheme A Only**	
050	The required sensors, for the continuous monitoring of the parameters listed in the ETM-A, are fitted?	NA
050a	Records and reports of parameters can be produced in accordance with the ETM-A?	NA
050b	Compliance checks carried out in accordance with the instructions contained in the ETM-A?	NA
050c	Any spot checks of emissions included in the ETM-A have been carried out, any required sensors and equipment are installed as stipulated in the ETM-A? NOTE: where a EGCS approved in accordance with Scheme A is fitted with continuous exhaust gas emissions monitoring equipment in order to comply with regional or national regulation (e.g. the European Sulphur Directive) then the arrangements are to be surveyed in accordance with DC.	NA
100	Checks have been carried out to confirm that the EGCS system is in accordance with the arrangements provided in the ETM-A?	NA
150	Verification of EGCS compliance completed in accordance with the instructions provided in the ETM-A?	NA
DC	**Scheme B Only**	
050	The exhaust gas monitoring system has been demonstrated as being in working condition? NOTE: the EGCS is not required to be fully operational to demonstrate that the monitoring system is in working condition. However if the monitoring system requires the EGCS to be in operation to allow verification then the EGCS will be required to be operational	Yes
050a	The zero and span checks were performed as per the OMM? NOTE: manufacturer's commissioning records and calibration certificates are to be used to demonstrate that the equipment has been correctly calibrated for the application.	Yes
050b	Any other operating checks required by the OMM to ensure the required operation of the monitoring system have been performed? NOTE: the system check (calibration/function check without gas) is to be demonstrated.	Yes
100	The required sensors, for the daily spot checks of the parameters listed in the OMM, are fitted?	Yes
150	The data recording components and arrangements for exhaust gas monitoring are as per the OMM?	Yes
150a	The exhaust gas data recording system can produce the reports specified in the OMM?	Yes
150b	Exhaust gas emissions reports inspected and demonstrate compliance with the applicable emission limits?	Yes

DD	Scheme A & Scheme B	
050	The combustion devices to which the EGCS is fitted are in accordance with the description given in the ETM-A or ETM-B, as applicable?	**Yes**
100	The arrangement of the EGCS and any associated equipment are as given in the ETM-A or ETM-B, as applicable?	**Yes**
100a	The EGCS washwater monitoring system components and arrangement are as per the OMM, including those applicable to the washwater additives or other substances as identified in the ETM-A or ETM-B as applicable?	**Yes**
100b	The washwater rate is in accordance with the assumed values used in determining the: a. Polycyclic Aromatic Hydrocarbons (PAH) b. Nitrate limits applicable	**Yes**
100c	The washwater monitoring system was demonstrated in working conditions? NOTE – This may be demonstrated by running various pumps associated with the system and observing the measured readings	**Yes**
100d	The zero and span checks of the washwater pH, PAH and turbidity monitors were performed as per the OMM?	**Yes**
100e	In addition, any other operating checks required by the OMM to ensure the required operation were performed?	**Yes**
100f	The arrangements are in place for the sampling and analysis of washwater nitrate content? Washwater nitrate analysis available and EGC record book updated? NOTE: If nitrate analysis is not available at the time of survey, arrangements are to be made for confirmation at a later date.	**No**
100g	Discharged washwater plume pH measured externally from the ship (at rest in harbour), as applicable?	**Yes**
100h	Wash water discharge pH has been verified by calculation or modelling as an alternative to physical measurement; details are included within the OMM?	**Yes**
200	The data recording components and arrangements for washwater are as per the OMM?	**Yes**
200a	The washwater data recording system can produce the reports specified in the OMM?	**Yes**
200b	Washwater reports inspected and demonstrate compliance with applicable emission limits?	**Yes**
300	The workmanship of the monitoring and recording system installation was satisfactory?	**Yes**
350	Was it confirmed that EGCS audible and visual alarms operate satisfactorily?	**Yes**
400	Was it confirmed that when applicable sufficient consumables for recording devices are onboard?	**Yes**
450	The procedures given in the SECP are incorporated in the ships operating procedures?	**Yes**
450a	Ship safety management system incorporates details of safe working procedures and equipment?	**Yes**

DE Remarks

DD 100f , Nitrate analysis not available at time of survey , arrangement are to be made for confirmation at a later date .(Washwater analysis for nitrates in accordance with MEPC.259(68) 10.1.5. is to be attached to the EGCS record book and analysis reports provided at intervals described in MEPC.259(68) 10.1.5.2.

Surveyed By

Place of Survey **at sea , Marseille to Barcelona**

Date of Survey **28 August 2016**

Lloyd's Register EMEA
Marseille OFFICE
Initials ALG

Arnaud LE GALL
Surveyor Lloyd's Register EMEA

a member of the Lloyd's Register group.

** Delete as appropriate*

See Design Appraisal Document. Lloyd's Register

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ECOSPRAY TECHNOLOGIES

Exhaust Gas Cleaning System
Technical Manual – Scheme B

Open-Loop Seawater DeSOx Absorption System 'ECO-DeSOx™' for MV Oosterdam

This Technical Manual describes the Exhaust Gas Cleaning System Scheme B (ETM-B). It has been developed in accordance with the requirements given in the 2015 Guidelines for Exhaust Gas Cleaning Systems – MEPC-259(68) Section 5.6.1

Purchase Order number:	**1079709**
Job number:	**2015_40_APC**
Ship name:	**MV Oosterdam**
IMO number:	**9221281**
System manufactured by:	**Ecospray Technologies S.r.l., Alzano Scrivia, Alessandria, Italy**
Unit model:	**ECO-DeSOx**
Ecospray project number:	**15-040-APC**

An EGC System is fitted for SOx emission control purposes to each of the DGs listed below, and each DG has a designated DeSOx Tower:

Diesel Generator number:	1	2	4
Location in ship:	**Engine room (Aft)**	**Engine room (Aft)**	**Engine room (Fwd)**
Engine:	**Wartsila 16ZAV40S**	**Wartsila 12ZAV40S**	**Wartsila 16ZAV40S**
MCR:	**11,520 kW**	**8,640 kW**	**11,520 kW**
Speed:	**514 rpm**	**514 rpm**	**514 rpm**
Cycle:	**4-stroke**	**4-stroke**	**4-stroke**
DG Serial number:	**12338**	**12341**	**12339**
EGC Tower number:	**15-040-APC-SC-0100**	**15-040-APC-SC-0200**	**15-040-APC-SC-0400**

Approved in accordance with regulation 4 of MARPOL Annex VI as an equivalent means of achieving compliance with regulation 14 of that Annex.

If amendments are necessary to the contents of this Manual, either as replacement or additional pages, these are to be approved by the Administration before implementation.

Client:	**Holland America Line**
Revision:	**16 May 2016**

Prepared by	Checked by	Approved by
Paolo Feltri		
Paolo Feltri	**Fabio Calcagno**	**Maurizio Archetti**

Message

From: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
Sent: 11/28/2016 11:59:18 AM
To: Davies, Darren [Darren.Davies@lr.org]
CC: Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Koningsdam, IMO 9692557

Dear Mr. Davies:

Thank you.

r/Mike Rand

From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Monday, November 28, 2016 3:59 AM
To: Rand, Michael P CIV
Cc: samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: [Non-DoD Source] RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Koningsdam, IMO 9692557

Good Morning Capt. Rand,

With reference to your query of MV Koningsdam's EGCS capacity, the inserted image below shows the information you are seeking. If you prefer this to be presented in a different format, please let me know.

4 Operating Limits

The following table presents operating limits for the EGC System when the system is in the WET condition, there are no operating limits on the system when it is operating in the DRY condition.

		DGI2	DGI3
Operating limits, or range of operating values			
Max. Fuel oil sulphur content [% m/m]		**3.5**	**3.5**
Salinity levels		[nac]	[nac]
Wash-water additives		[nac]	[nac]
Minimum wash-water inlet alkalinity [μmol kg^{-1}]		**1300**	**1300**
Minimum dilution water inlet alkalinity [μmol kg^{-1}]		**1300**	**1300**
Exhaust gas mass flow rate [kg/h] (**Note:** Max. value corresponds to 85% MCR)	Min	[nac]	[nac]
	Max	75,510	75,510
Exhaust gas temperature at DeSOx Tower inlet [°C]	Min	[nac]	[nac]
	Max	380	380
Exhaust gas temperature at DeSOx Tower outlet [°C] (with the DeSOx Tower in operation)	Min	[nac]	[nac]
	Max	10°C above seawater temp.	
Exhaust gas pressure at DeSOx Tower inlet [hPa]	Min	[nac]	[nac]
	Max	50	50
Exhaust gas differential pressure across DeSOx Tower [hPa]	Min	[nac]	[nac]
	Max	**40**	**40**
Wash-water flow rate [m^3/h]	Min	**350**	**350**
	Max	**750**	**750**
Wash-water pressure at nozzles [barg]	Min	**0.3**	**0.3**
	Max	[nac]	[nac]

Table 3. Operating Limits **Note:** [nac] = not a constraint

Note: The parameters highlighted in **bold** in the table above are operating limits that are connected with the compliant operation of the EGC System, the other parameters are manufacturers' advised reasonable operating ranges.

Best Regards,

Darren Davies
Specialist, Engineering
Engineering Systems
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E darren.davies@lr.org

Lloyd's Register Marine & Offshore
Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.
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-----Original Message-----
From: Rand, Michael P CIV [mailto:Michael.P.Rand@uscg.mil]
Sent: 23 November 2016 12:06
To: Davies, Darren
Cc: samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Koningsdam, IMO 9692557

Dear Mr. Davies:

Thank you for submitting the documentation for the exhaust gas cleaning systems for the M/V KONINGSDAM.

Please provide the scrubber exhaust capacity in cubic meters/hour. I saw the footnote explaining that the value (kg/h) was from the engine tech manual, but I need it in cubic meters/hour.

I will contact you if I have additional questions.

Thank you.

r/Mike Rand

-----Original Message-----
From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Monday, November 21, 2016 5:51 AM
To: Rand, Michael P CIV
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: [Non-DoD Source] USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Koningsdam, IMO 9692557

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installations on board M/V Koningsdam, IMO 9692557. Please could you acknowledge receipt of this notification.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems & MARPOL Department

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

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Message

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 9/14/2017 12:33:48 PM
To: Samulski, Michael [samulski.michael@epa.gov]
CC: Laroo, Chris [laroo.chris@epa.gov]; Valerie Chatterley [Ex. 6 Personal Privacy (PP)]
2tomdow[Ex. 6 Personal Privacy (PP)] Storari, Renato (CarnCorp) [RStorari@carnival.com]
Subject: Fwd: Crown Princess Exhaust Gas Testing Final Report, by Wartsila Tech Services
Attachments: Measurement_report_final_revb_signed.pdf; ATT00001.htm

Dear Mike;
Regret the long delay but we believe we are now on the right track and submit the attached report from testing on Crown Princess.

The results are a little short of what we have experienced in other recent testing on a non-ECA-Exempt ship, but we believe this is due largely to the fact that Crown Princess is a common-rail ship which already has a low smoke signature.

With your confirmation that the attachment is acceptable we will immediately start booking subsequent tests on other ships, as agreed.

Thanks and best regards,
Mike

Begin forwarded message:

From: "Deltreppo, Massimiliano" <massimiliano.deltreppo@wartsila.com<mailto:massimiliano.deltreppo@wartsila.com>>
To: "Kaczmarek, Michael (CarnCorp)" <MKaczmarek@carnival.com<mailto:MKaczmarek@carnival.com>>
Cc: "Storari, Renato (CarnCorp)" <RStorari@carnival.com<mailto:RStorari@carnival.com>>, "Valerie Chatterley [Ex. 6 Personal Privacy (PP)] [Ex. 6 Personal Privacy (PP)] [Ex. 6 Personal Privacy (PP)] "Gremese, Cesare" <Cesare.Gremese@wartsila.com<mailto:Cesare.Gremese@wartsila.com>>, "Sundell, Tom" <tom.sundell@wartsila.com<mailto:tom.sundell@wartsila.com>>, "Tuuf, Jean-Christoffer" <jean-christoffer.tuuf@wartsila.com<mailto:jean-christoffer.tuuf@wartsila.com>>, "Vestergren, Andreas" <andreas.vestergren@wartsila.com<mailto:andreas.vestergren@wartsila.com>>
Subject: RE: Crown Princess Exhaust Gas Testing Final Report, by Wartsila Tech Services

Dear Mike,

Good day,
Please find attached the revised report with below changes implemented as requested and signed.

Let us know if report is ok for EPA submission.

Available to discuss further,

Thanks,
Kr
Max

[cid:image001.png@01D3271B.15B80CA0]

WÄRTSILÄ

Technical Service

		Doc.ID:	DBAE542919
Title:	Crown Princess, W12V46 + Scrubber	Status:	Approved
		Checked:	TSu
Subject:	Emissions measurement report	Pages:	1/46
Author:	JCT	Created:	15.8.2017

Emissions measurement report

Crown Princess

- Emission measurements.

ilac-MRA

FINAS
Finnish Accreditation Service
T194 (EN ISO/IEC 17025)

Reported by: **JC.T**
Date: **15.8.2017**

CONTENT

1. INTRODUCTION
2. INSTALLATION DATA
3. MEASUREMENT COMPANY DATA
4. CUSTOMER DATA
5. PERSONNEL
6. RESULTS

APPENDIXES

1. INTRODUCTION

The emission measurements on the, Crown Princess, engine 91592 were made during normal operation at sea.

Wärtsilä Finland, Technical Service, Emission Measurements is an accredited testing laboratory, T194 by FINAS (Finnish Accreditation Service) and fulfills the requirements of the SFS-EN ISO/IEC 17025 standard. Accredited compounds are NOx, CO, CO_2, THC, NH3, SO_2 and O_2. PM according to ISO 8178 is not accredited.

The measurements were performed according to the Annex VI of MARPOL 73/78 (IMO NOx code) Tier II procedures and according to ISO 8178.

The following components were measured:
- NOx, CO, CO_2, O_2, SO2 with Horiba PG-350 using calibration gas at site.
- PM according to ISO 8178 using quartz and full teflon filters with a dilution factor of 6-7. Quartz filters were analyzed for EC (elemental carbon), OC (organic carbon). SO_4 has been analyzed from full teflon filters.

2. INSTALLATION DATA

Installation:	Crown Princess
Address:	Hamilton, Bermuda
Engine type:	Wärtsilä 12V46
Engine number:	91592
Running hours:	N/A
Date of measurements:	7-12.6.2017

3. MEASUREMENT COMPANY DATA

Company:	Wärtsilä Finland Oy
Department:	Technical Service, Emission Measurements
Contact person:	Tom Sundell
Address:	Tarhaajantie 2 FI-65380 Vaasa FINLAND
Contact info:	Tel. 010 - 709 0000 Fax. 010 -709 3279 E-mail: tom.sundell@wartsila.com

4. CUSTOMER DATA

Company:	Carnival Corporation & plc
Operator:	Princess Cruise line
Contact person:	Mike Kaczmarek
Address:	3655 NW 87 Avenue | Doral, FL 33178
Contact info:	Tel. +1 305 987 4605
E-mail:	MKaczmarek@carnival.com

5. PERSONNEL

The members of the emission measurement group were Jukka Lankinen and Pekka Laine from Wärtsilä Finland Oy / Technical Service / Emission Measurements Laboratory. Jean-Christoffer Tuuf has done the report.

6. RESULTS

The measurement results are presented in table 1 to 3 and in picture 1 to 9. The results in table 1 to 3 are calculated as the average value of the last 10 minutes of each load point. Graphs of the measured emission levels during each load point are also shown in appendix 1.

The PM results in pictures 1 to 9 are calculated as an average of 3 filters taken during the load point. More details can be found in appendix 2. Exhaust gas flow is calculated according to ISO 8178.

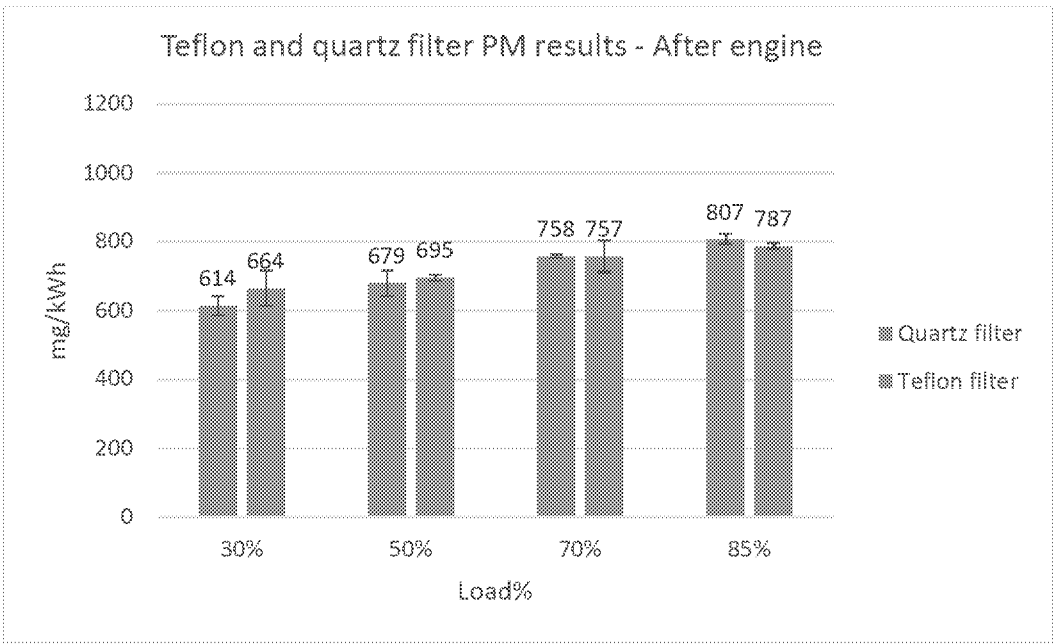
The carbon balance calculations, according to IMO NOx code, in appendix 4 also includes mg/Nm3 and g/kWh calculations for gaseous compounds. Fuel consumption for the engines were measured onboard with ship's own flow meters. A fuel sample was taken during measurement and analyzed by an accredited laboratory. The fuel composition (C, H, N, S, O) was used as input parameters in the calculations. Fuel analyses is present in appendix 3. The IMO NOx values as (g/kWh) and PM measurements results are consistent with procedures outlined in the IMO NOx code standards. Measurements provided by Wartsila are considered creditable and traceable per the IMO NOx code.

Note the IMO NOx values (*g/kWh*) and PM measurements results are not given as accredited results, as the calculations of the IMO NOx values involve also fuel oil analysis and recording of operating data with the ships own instrumentation, which are not within the laboratory responsibility and thus the calibration of these meters according to the IMO NOx code standards has not been traced.

The analysis certificates for the used calibration gases are presented in appendix 8. The analysis accuracy and traceability for the used calibration gases have been verified to be within acceptable uncertainty limits (± 2 %) according to ISO 8178 and IMO NOx Code standard requirements by comparing to calibration gases with accredited analysis certificates.

Table 1. Measured emission levels after engine.

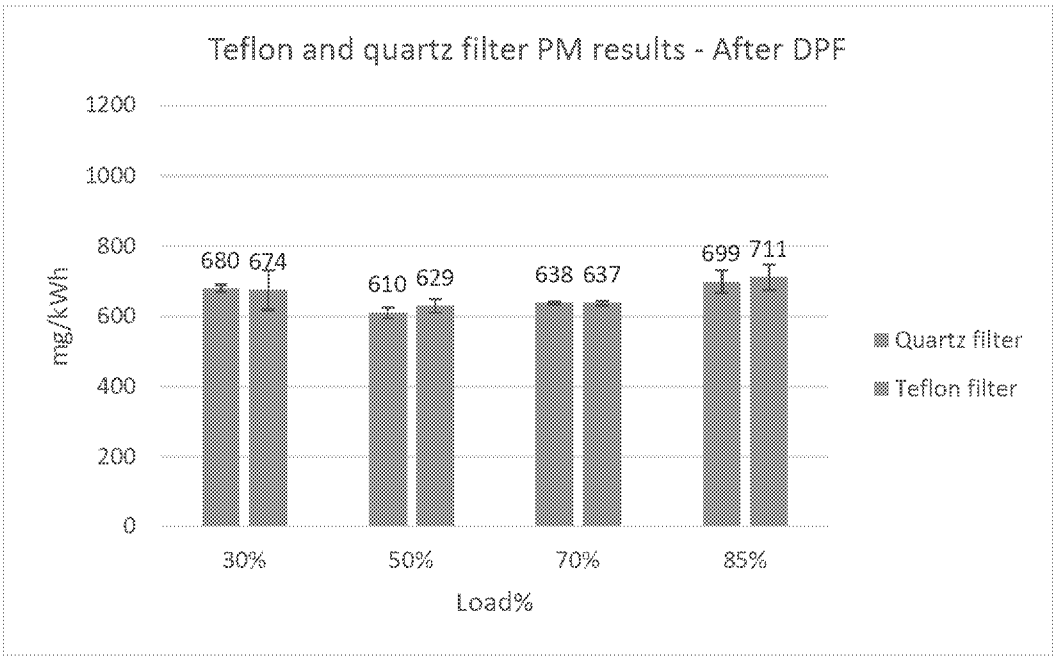
Crown Princess – gaseous compounds							
Time for calculating averaged result	Loop	Engine power (kW)	CO (ppm, dry, act. O_2)	NOx (ppm, dry, act. O_2)	O_2 (vol-%, dry)	CO_2 (vol-%, dry)	SO_2 (ppm, dry, act. O_2)
21:30 – 21:40	Open	10440	49	1367	12.58	6.35	529
22:50 – 23:00	Open	8730	51	1026	13.05	6.02	529
00:00 - 00:10	Open	6010	63	837	14.48	4.98	442
01:05 – 01:15	Open	3910	109	1160	14.53	4.95	420



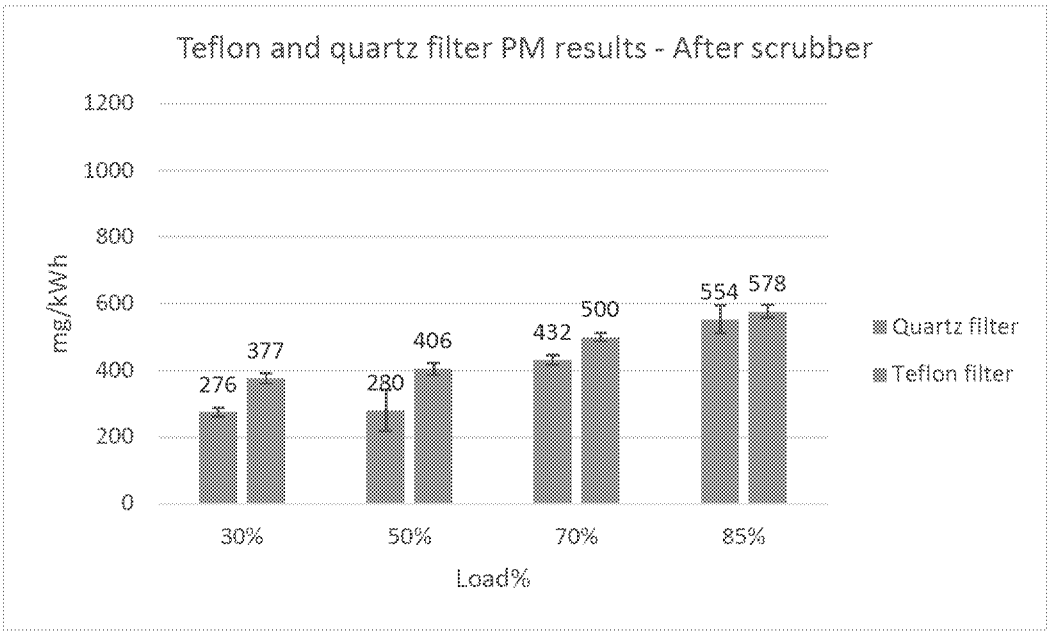
Picture 1. PM results measured after engine, Quartz and Teflon filters.

Table 2. Measured emission levels after DPF.

Crown Princess – gaseous compounds							
Time for calculating averaged result	Loop	Engine power (kW)	CO (ppm, dry, act. O_2)	NOx (ppm, dry, act. O_2)	O_2 (vol-%, dry)	CO_2 (vol-%, dry)	SO_2 (ppm, dry, act. O_2)
23:20 – 23:30	Open	10170	29	1332	12.69	6.30	516
22:00 – 22:10	Open	8510	32	1051	13.04	6.03	523
00:25 - 00:35	Open	6160	50	849	14.50	4.96	461
00:00 – 00:10	Open	3730	71	1184	14.44	5.00	461

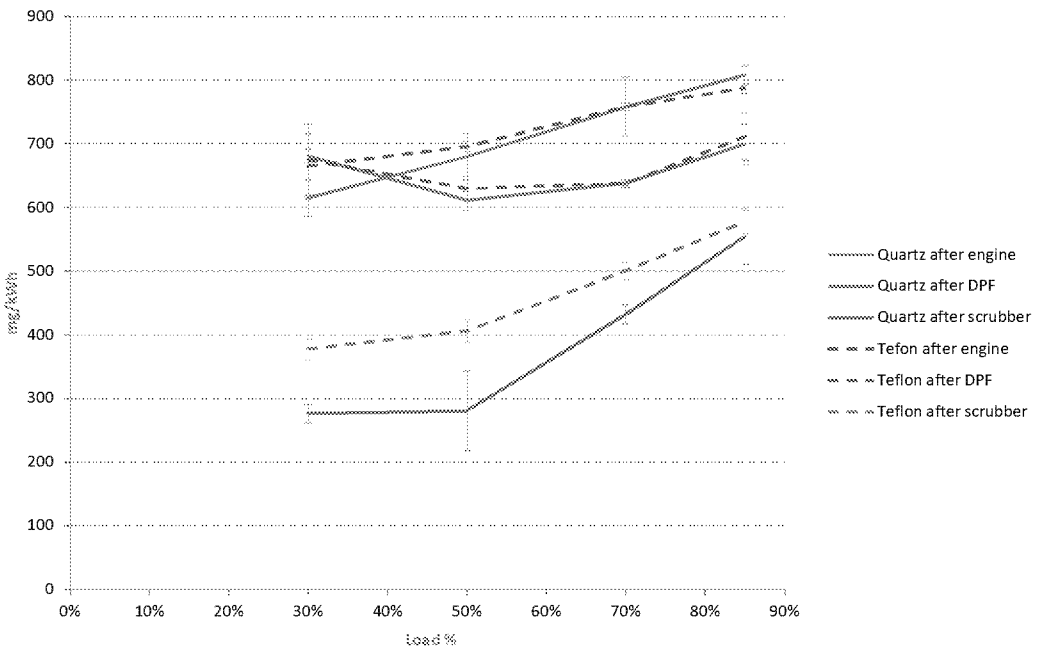


Picture 2. PM results measured after DPF-filter, Quartz and Teflon filters.



Picture 3. PM results measured after scrubber, Quartz and Teflon filters

Picture 4 below shows a comparison of different filter material and its effect on PM measurement results. Two different filter types have been evaluated. Teflon filters and Quartz filters.



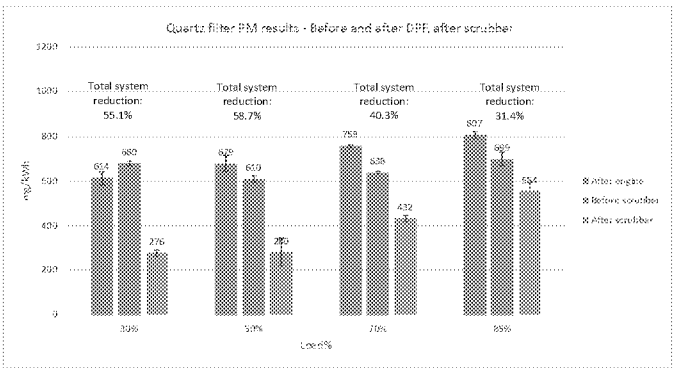
Picture 4. Teflon filter and Quartz filter comparison.

The readings in table 3 below, marked as "scrubber monitoring" are coming from the Ship's own emission monitoring system. Reported as a reference.

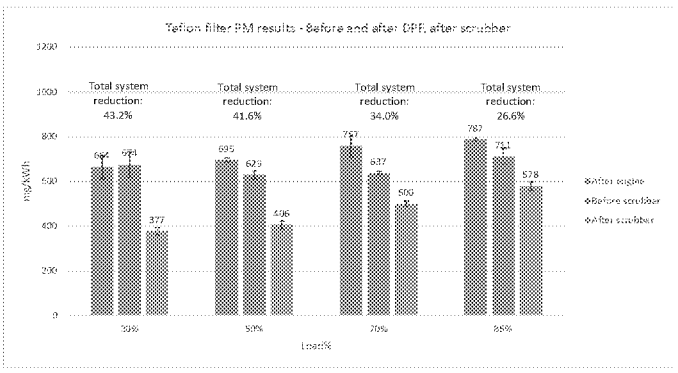
Table 3. Measured emission levels after the scrubber

Crown Princess - gaseous compounds									Scrubber monitoring		
Time for calculating averaged result	Loop	Engine power (kW)	CO (ppm, dry, act. O_2)	NOx (ppm, dry, act. O_2)	O_2 (vol-%, dry)	CO_2 (vol-%, dry)	SO_2 (ppm, dry, act. O_2)	SO2/ CO2	CO2	SO2	SO2/ CO2
19:20 – 19:30	Open	10090	31	1293	12.65	6.39	17	2.7	9.1	27	3.0
18:05 – 18:15	Open	8500	37	1021	13.11	6.04	16	2.6	8.4	24	2.8
17:00 – 17:10	Open	6280	50	852	14.52	4.99	10	2.0	9.3	19	2.1
16:20 – 16:30	Open	3770	68	1130	14.47	4.99	8	1.6	6.5	16	2.4

Reduction rates over the scrubber can be seen from picture 6 and 7 below.

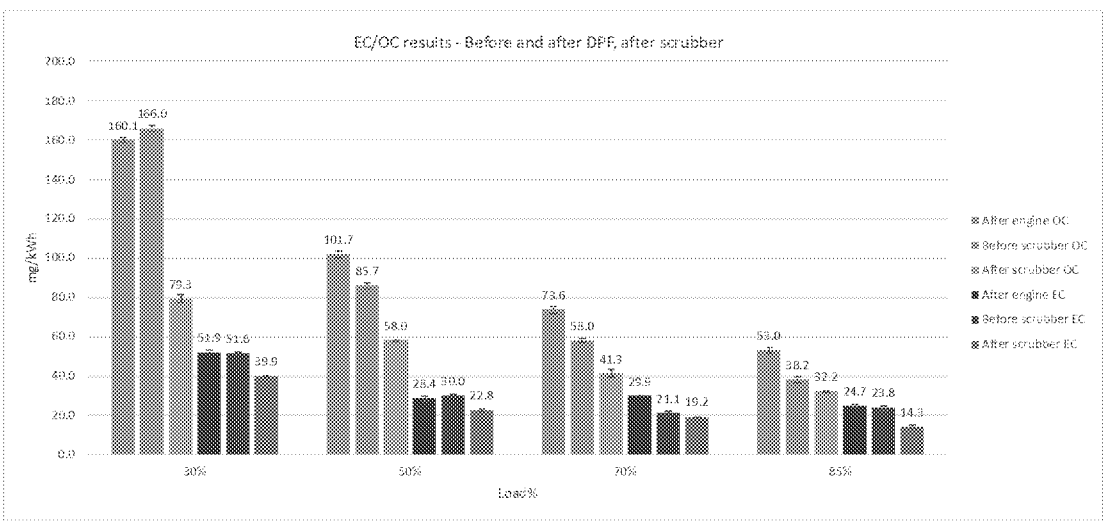


Picture 6. PM reduction over scrubber, Quartz filters.

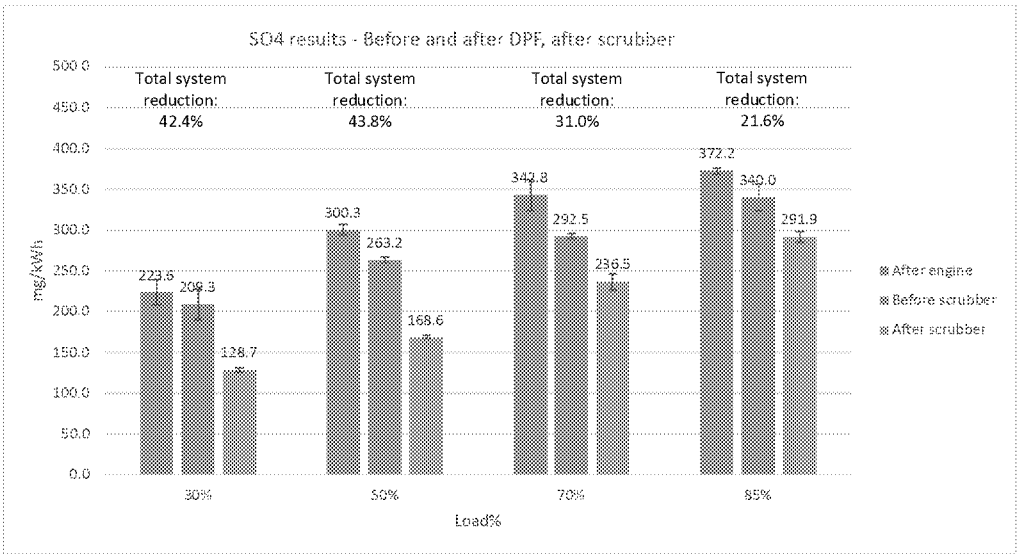


Picture 7. PM reduction over scrubber, Teflon filters.

Picture 8 and 9 describes how scrubber operation on different engine loads influence the EC/OC and SO4 levels. EC/OC has been analyzed from the Quartz filters and SO4 level has been analyzed from full Teflon filters.



Picture 8. EC/OC levels as a function of engine load.



Picture 9. SO4 levels as a function of engine load.

Index of Appendices

1. Graphs of measured gaseous compounds
2. PM calculations
3. Fuel analysis
4. Carbon balance calculation sheets.
5. OC/EC results
6. SO_4 analysis results
7. Measurement equipment setup
8. Calibration gas bottle certificates
9. Engine operation data
10. Calibration certificates, linearity and interference tests
11. Description of exhaust gas particulate emission measurements

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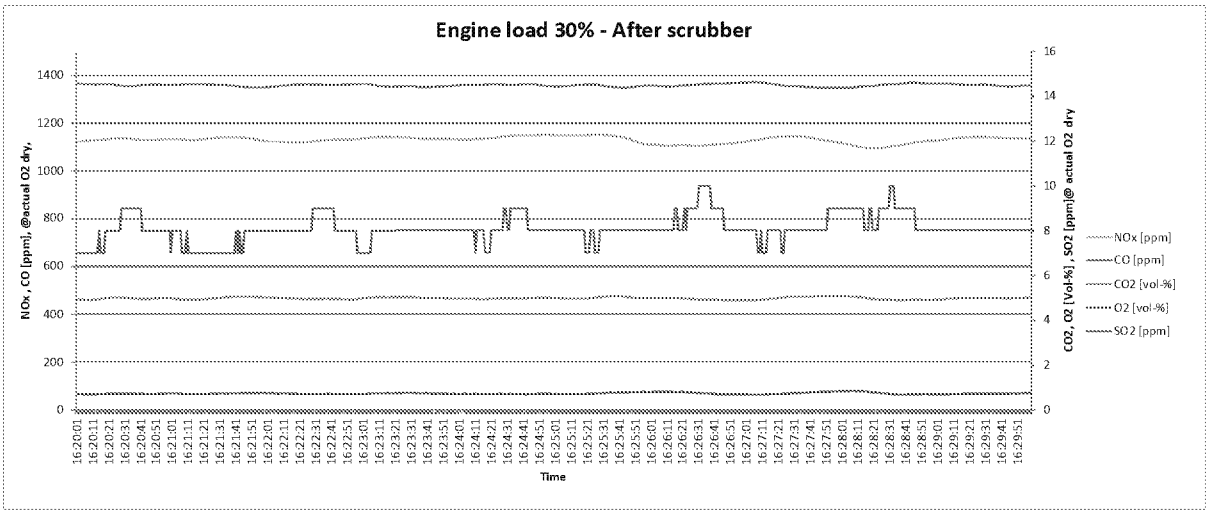
Finnish Accreditation Service
T194 (EN ISO/IEC 17025)

Wärtsilä Finland Oy
Technical Service
Emission Measurement Laboratory

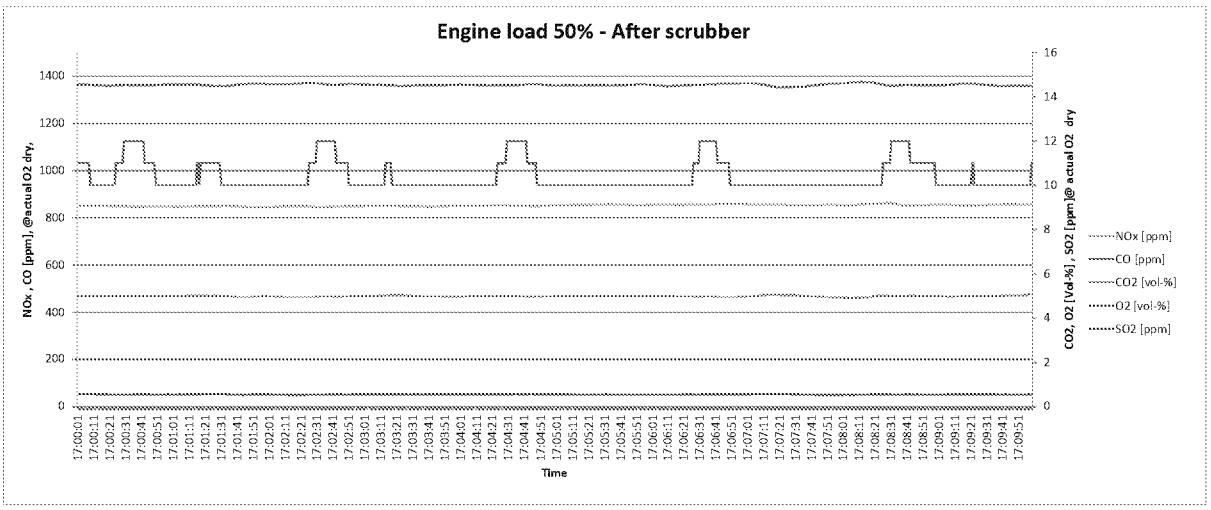
Jean-Christoffer Tuuf
Jean-Christoffer Tuuf

WÄRTSILÄ Technical Service	Title: Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
		Status:	Approved
		Checked:	TSu
	Subject: Emissions measurement report	Pages:	11/46
	Author: JCT	Created:	15.8.2017

Appendix 1 (1/6)



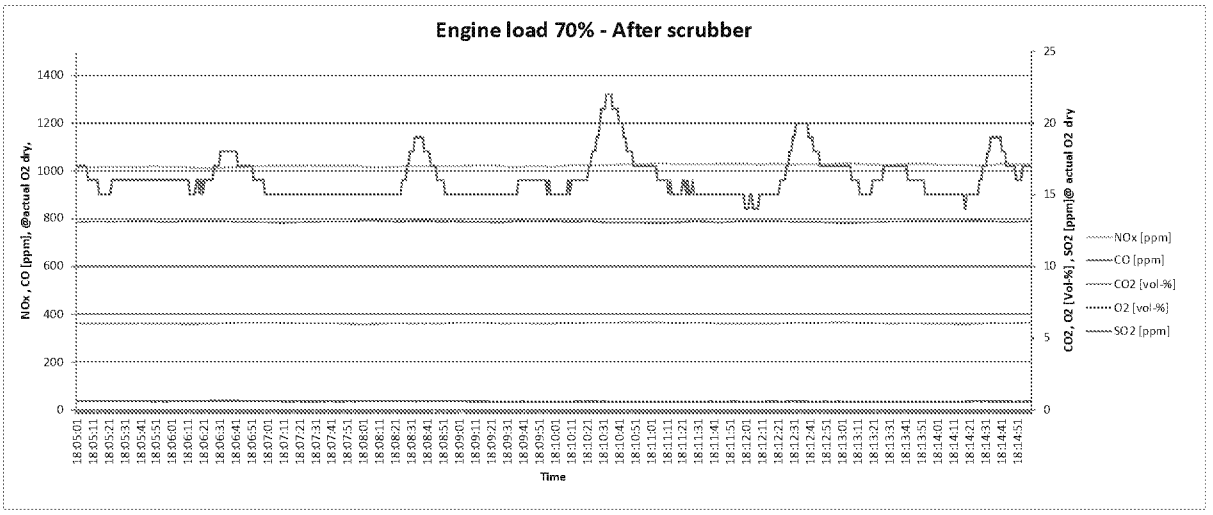
Beginning:	7.6.2017 16:20	CO [ppm]	CO2 [vol-%]	O2 [vol-%]	SO2 [ppm]	NOx [ppm]
End:	7.6.2017 16:30	68	4.99	14.47	8	1130
Beginning:	7.6.2017 16:20	CO [ppm]	CO2 [vol-%]	O2 [vol-%]	SO2 [ppm]	NOx [ppm]
End:	7.6.2017 16:30	68	4.99	14.47	8	1130



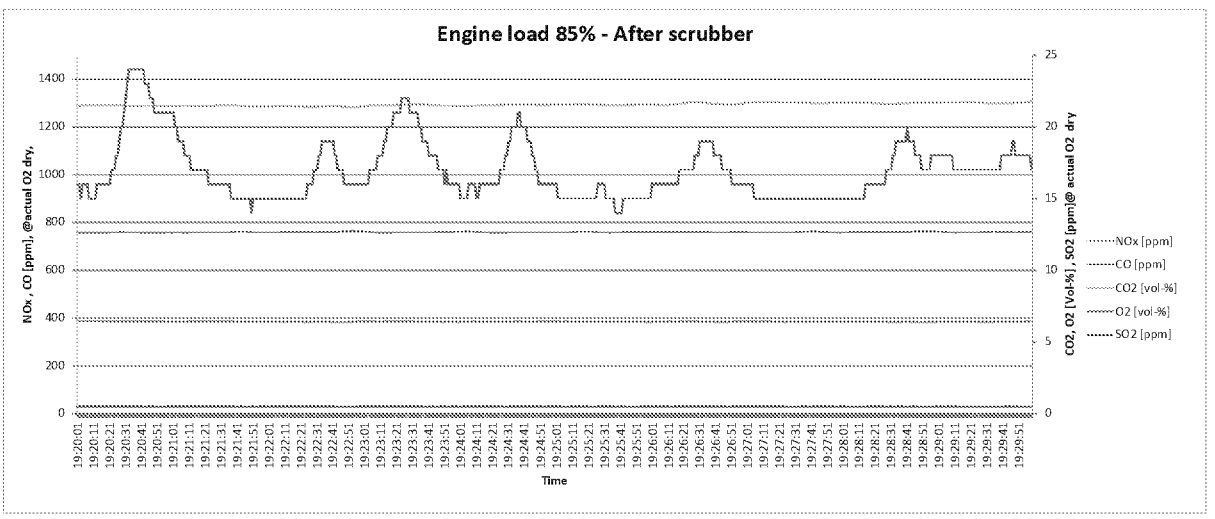
Beginning:	7.6.2017 17:00	CO [ppm]	CO2 [vol-%]	O2 [vol-%]	SO2 [ppm]	NOx [ppm]
End:	7.6.2017 17:10	50	4.99	14.52	10	852
Beginning:	7.6.2017 17:00	CO [ppm]	CO2 [vol-%]	O2 [vol-%]	SO2 [ppm]	NOx [ppm]
End:	7.6.2017 17:10	50	4.99	14.52	10	852

WÄRTSILÄ Technical Service	Title: Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
		Status:	Approved
		Checked:	TSu
	Subject: Emissions measurement report	Pages:	12/46
	Author: JCT	Created:	15.8.2017

Appendix 1 (2/6)



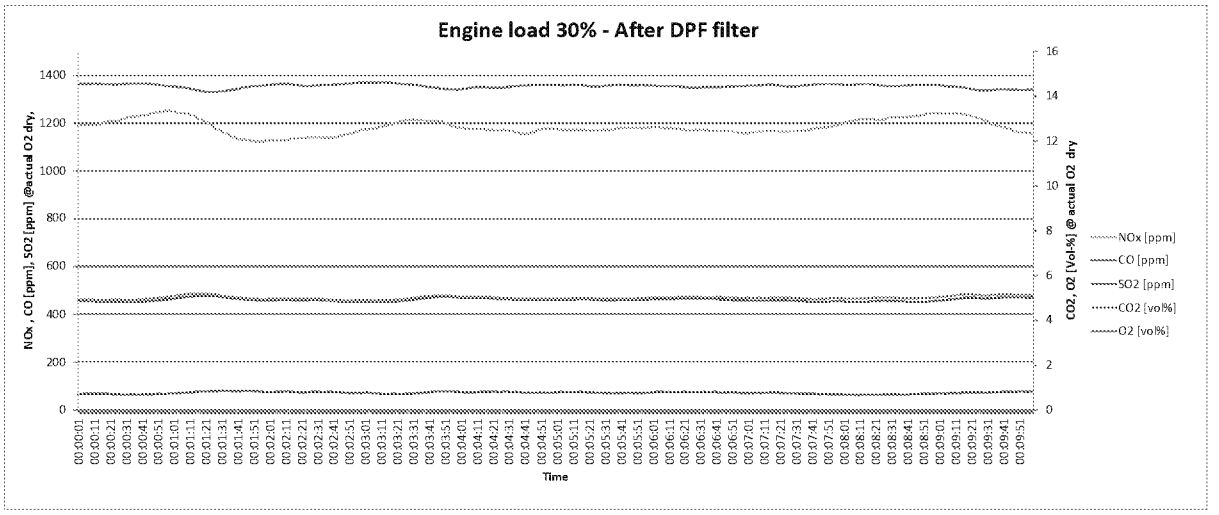
Beginning:	7.6.2017 18:05	CO [ppm]	CO2 [vol-%]	O2 [vol-%]	SO2 [ppm]	NOx [ppm]
End:	7.6.2017 18:15	37	6.04	13.11	16	1021
Beginning:	7.6.2017 18:05	CO [ppm]	CO2 [vol-%]	O2 [vol-%]	SO2 [ppm]	NOx [ppm]
End:	7.6.2017 18:15	37	6.04	13.11	16	1021



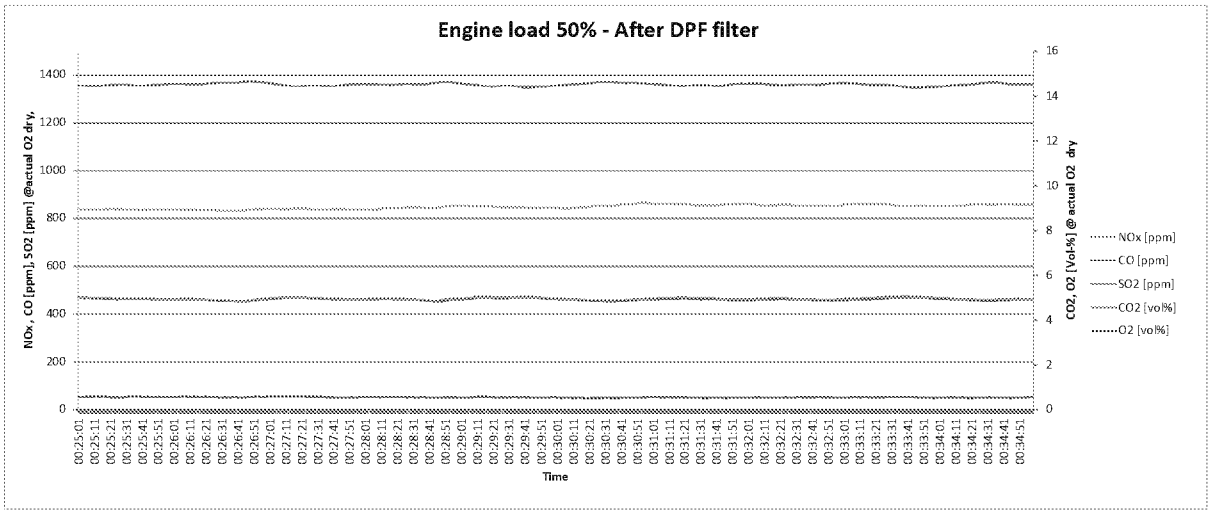
Beginning:	7.6.2017 19:20	CO [ppm]	CO2 [vol-%]	O2 [vol-%]	SO2 [ppm]	NOx [ppm]
End:	7.6.2017 19:30	31	6.39	12.65	17	1293
Beginning:	7.6.2017 19:20	CO [ppm]	CO2 [vol-%]	O2 [vol-%]	SO2 [ppm]	NOx [ppm]
End:	7.6.2017 19:30	31	6.39	12.65	17	1293

WÄRTSILÄ Technical Service				
	Title:	Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
			Status:	Approved
			Checked:	TSu
	Subject:	Emissions measurement report	Pages:	13/46
	Author:	JCT	Created:	15.8.2017

Appendix 1 (3/6)



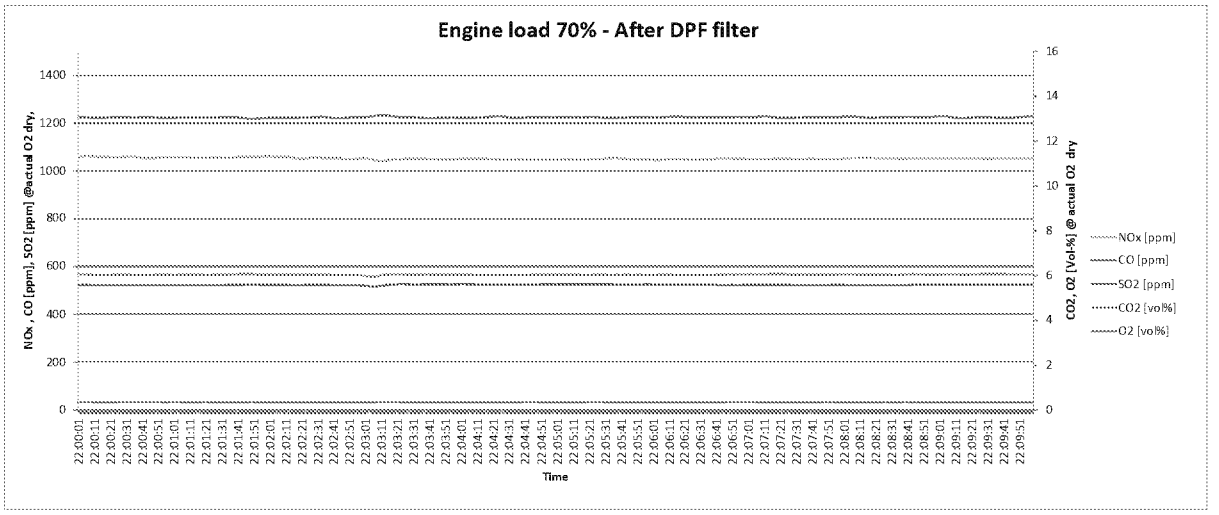
Beginning:	9.6.2017 00:00	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	9.6.2017 00:10	71	5.00	14.44	461	1184
Beginning:	9.6.2017 00:00	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	9.6.2017 00:10	71	5.00	14.44	461	1184



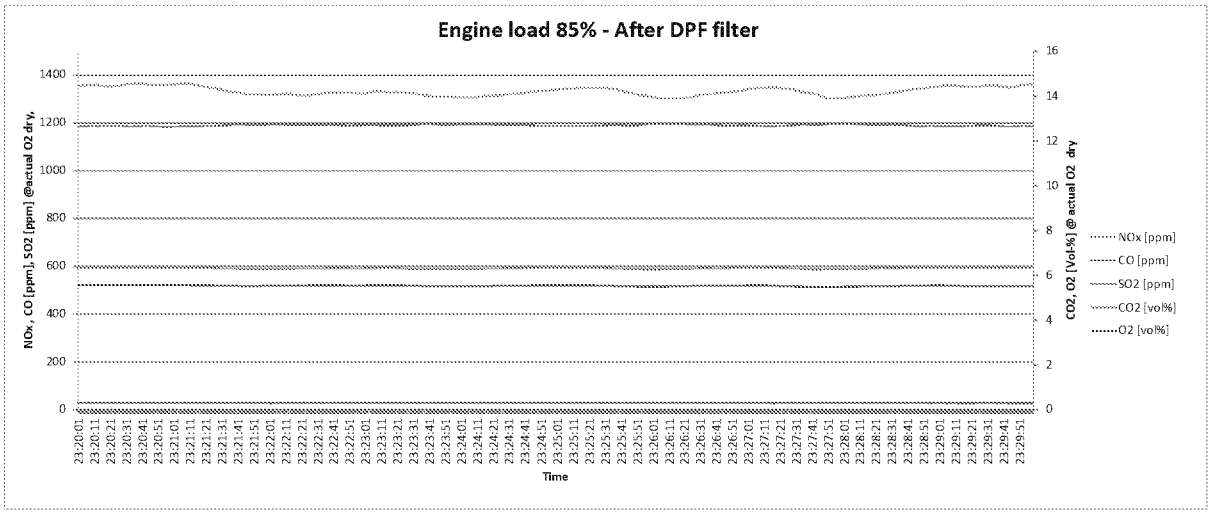
Beginning:	9.6.2017 00:25	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	9.6.2017 00:35	50	4.96	14.50	461	849
Beginning:	9.6.2017 00:25	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	9.6.2017 00:35	50	4.96	14.50	461	849

WÄRTSILÄ Technical Service				
	Title:	Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
			Status:	Approved
			Checked:	TSu
	Subject:	Emissions measurement report	Pages:	14/46
	Author:	JCT	Created:	15.8.2017

Appendix 1 (4/6)



Beginning:	9.6.2017 22:00	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	9.6.2017 22:10	32	6.03	13.04	523	1051
Beginning:	9.6.2017 22:00	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	9.6.2017 22:10	32	6.03	13.04	523	1051



Beginning:	9.6.2017 23:20	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	9.6.2017 23:30	29	6.30	12.69	516	1332
Beginning:	9.6.2017 23:20	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	9.6.2017 23:30	29	6.30	12.69	516	1332

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	Author:	JCT	Created:	15.8.2017

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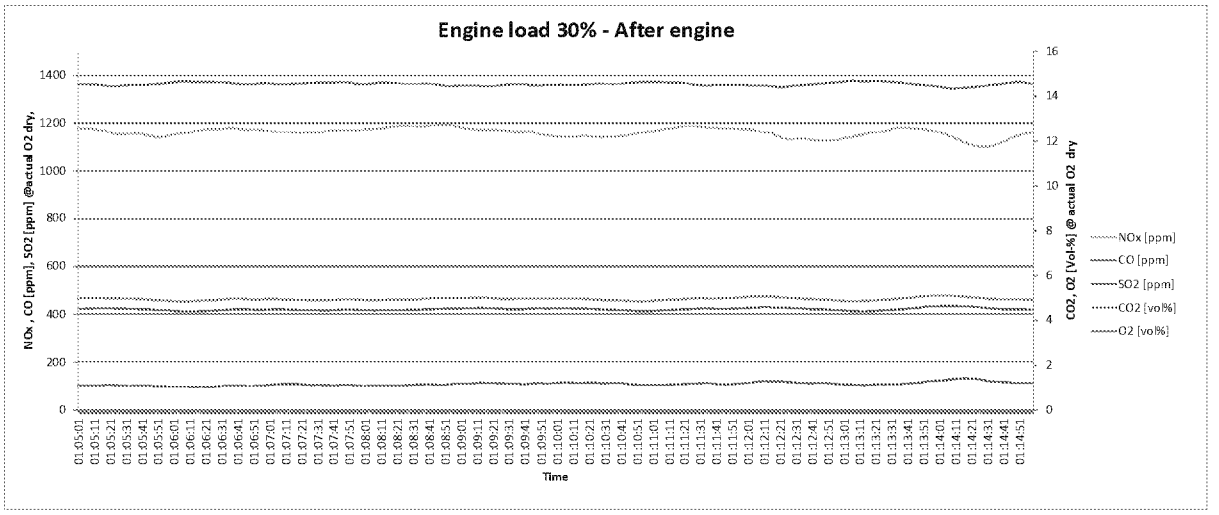
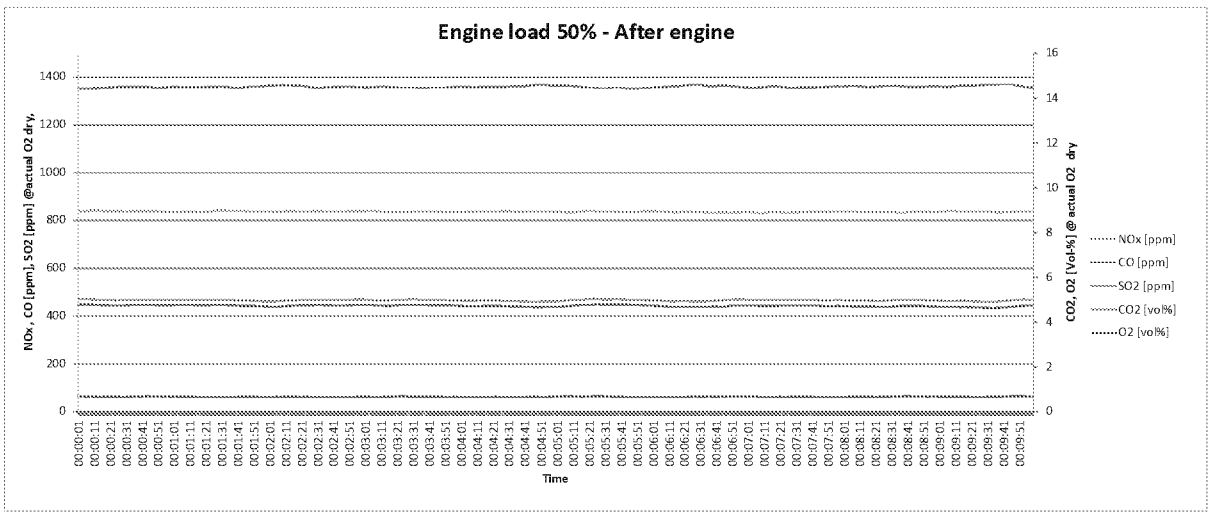


Beginning:	12.6.2017 01:05	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	12.6.2017 01:15	109	4.95	14.53	420	1160
Beginning:	12.6.2017 01:05	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	12.6.2017 01:15	109	4.95	14.53	420	1160



Beginning:	12.6.2017 00:00	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	12.6.2017 00:10	63	4.98	14.48	442	837
Beginning:	12.6.2017 00:00	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	12.6.2017 00:10	63	4.98	14.48	442	837

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	Author: JCT	Created:	15.8.2017

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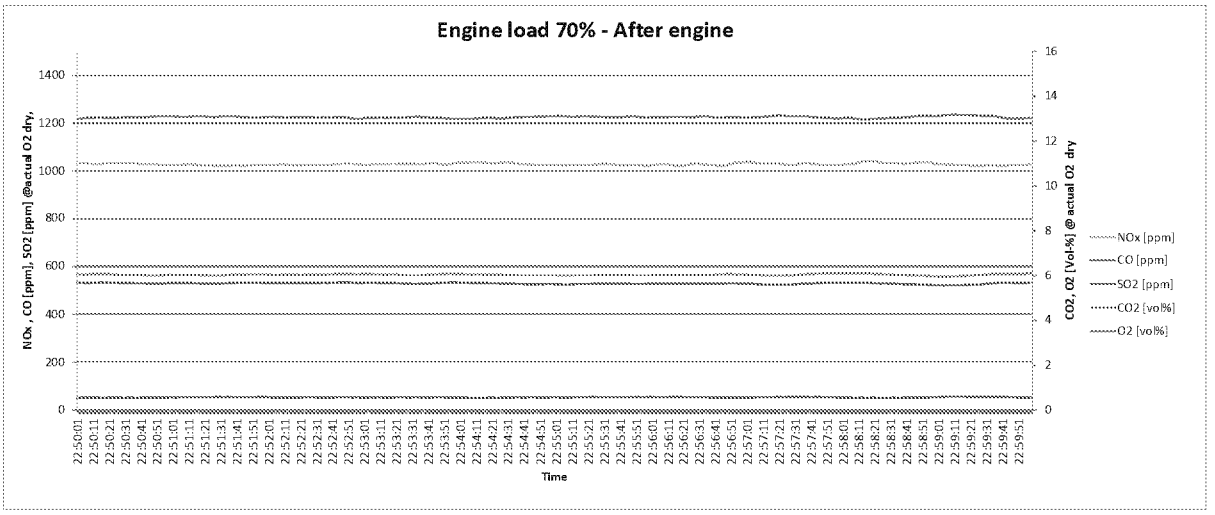
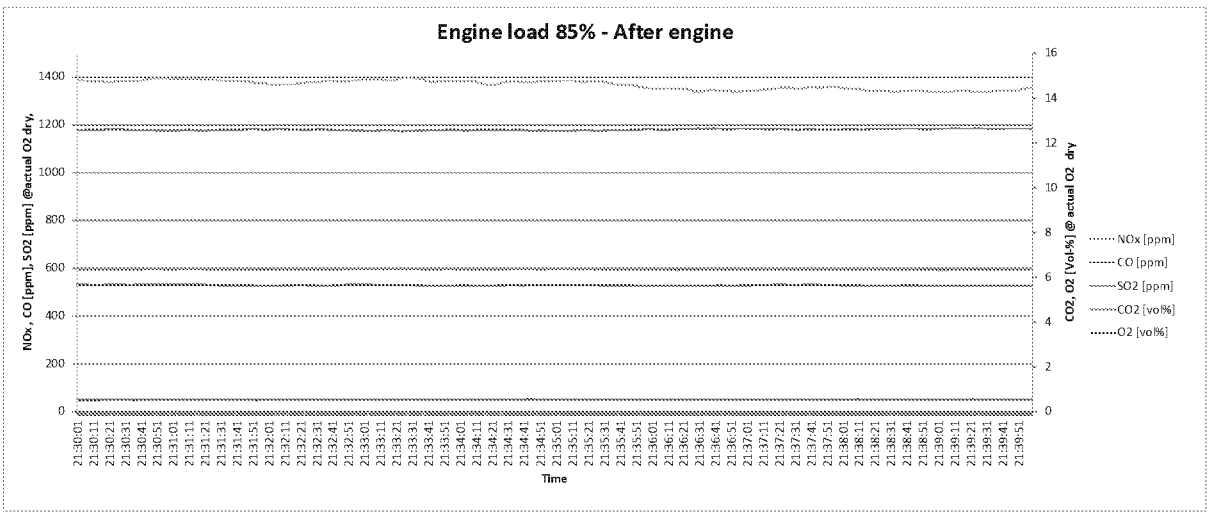


Beginning:	11.6.2017 22:50	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	11.6.2017 23:00	51	6.02	13.05	529	1026
Beginning:	11.6.2017 22:50	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	11.6.2017 23:00	51	6.02	13.05	529	1026



Beginning:	11.6.2017 21:30	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	11.6.2017 21:40	49	6.35	12.58	529	1367
Beginning:	11.6.2017 21:30	CO [ppm]	CO2 [vol%]	O2 [vol%]	SO2 [ppm]	NOx [ppm]
End:	11.6.2017 21:40	49	6.35	12.58	529	1367

Table 4. Measured particle levels after engine.

Crown Princess – PM measurements				
	Quartz filters		Teflon filters	
Engine Power (kW) – Load (%)	PM (mg/kWh)	PM (mg/Nm^3)	PM (mg/kWh)	PM (mg/Nm^3)
10440 / 85%	807.1	155.6	786.8	151.7
8730 / 70%	757.5	137.9	757.4	137.8
6010 / 50%	679.5	95.4	695.0	97.6
3910 / 30%	614.4	84.8	664.5	91.7

Table 5. Measured particle levels after DPF.

Crown Princess – PM measurements				
	Quartz filters		Teflon filters	
Engine Power (kW) – Load (%)	PM (mg/kWh)	PM (mg/Nm^3)	PM (mg/kWh)	PM (mg/Nm^3)
10170 / 85%	699.0	131.8	674.0	134.1
8510 / 70%	637.7	118.4	628.8	119.4
6160 / 50%	610.2	88.0	637.2	91.4
3730 / 30%	680.1	93.8	710.8	92.9

Table 6. Measured particle levels after scrubber.

Crown Princess – PM measurements				
	Quartz filters		Teflon filters	
Engine Power (kW) – Load (%)	PM (mg/kWh)	PM (mg/Nm^3)	PM (mg/kWh)	PM (mg/Nm^3)
10090 / 85%	553.7	109.1	577.7	113.8
8500 / 70%	432.0	77.9	499.8	90.1
6280 / 50%	280.4	40.1	405.6	58.0
3770 / 30%	276.0	38.7	377.4	52.9

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Quartz filter- after engine

WÄRTSILÄ Filter ID	Filter mass (mg) Before measurement Weighing 1	Weighing 2	After measurement Weighing 1	Weighing 2	Mass on Filter (mg)	INFO After engine quartz			Exhaust filtered m^3	Exhaust filtered m^3	Calculated values Particle concentration mg/m^3	Exhaust flow wet (q_{mew}) cotton method kg/kWh	Particle emission mg/kWh
K79	149.286000		154.026000		4.753								
K79					4.753	85%			0.030012487	0.032759374	158.7006078	7.11	629.3750569
K80	148.993000		153.576000		4.583								
K80					4.583	85%			0.030016758	0.032764036	152.8813796	7.11	792.1468577
K81	153.146000		157.810000		4.664								
K81					4.664	85%		155.6	0.030032415	0.032781126	155.2988677	7.11	805.7270313
K82	155.498000		159.622000		4.124			**807.1**					
K82					4.124	70%			0.030035539	0.032784538	137.30403	7.60	754.6835822
K83	158.940000		163.062000		4.122								
K83					4.122	70%			0.03004567	0.032795594	137.191151	7.60	753.8729154
K84	154.686000		158.867000		4.181								
K84					4.181	70%		137.9	0.030061503	0.032812876	139.9815362	7.60	784.2806862
K85	155.155000		158.104000		2.949			**757.5**					
K85					2.949	50%			0.030027598	0.032775868	96.29666339	9.68	638.8490361
K86	150.895000		153.481000		2.586								
K86					2.586	50%			0.030035868	0.032784895	89.42661462	9.68	635.8548207
K87	148.379000		151.340000		2.961								
K87					2.961	50%		95.4	0.030039031	0.032788347	98.57175582	9.68	762.0279277
K88	151.794000		154.418000		2.624			**679.5**					
K88					2.624	30%			0.030067769	0.032819716	87.28957792	9.87	632.4247573
K89	147.226000		149.833000		2.607								
K89					2.607	30%			0.030041545	0.032791092	86.77982899	9.67	629.6799733
K90	150.466000		152.878000		2.412								
K90					2.412	30%		84.8	0.030032265	0.032782053	80.31094949	9.87	581.8973898
0	#N/A		#N/A		#N/A			**614.4**					
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0	#N/A		#N/A		#N/A								
0		0			#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A		#N/A		#N/A								
0		0			#N/A	85%			#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A		#N/A		#N/A								
0		0			#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A		#N/A		#N/A								
0		0			#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
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WÄRTSILÄ Technical Service				
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			Checked:	TSu
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	Author:	JCT	Created:	15.8.2017

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Teflon filter- after engine

WÄRTSILÄ Filter ID	Filter mass (mg) Before measurement Weighing 1	Before measurement Weighing 2	After measurement Weighing 1	After measurement Weighing 2	Mass on Filter (mg)	INFO After engine- teflon filter			Exhaust filtered m³	Exhaust filtered m³	Calculated values Particle concentration mg/m³	Exhaust flow wet (q_{mew}) cetion method kg/kWh	Particle emission mg/kWh
K37	181.611000		186.314000		4.503								
K38	179.714000		184.277000		4.563	85%			0.030009032	0.032755503	150.0546218	7.11	773.5306859
K39	182.011000		186.601000		4.590	85%			0.030024505	0.032772492	151.9758606	7.11	788.4854396
K40	161.180000		165.613000		4.433	85%	151.7	786.8	0.030010742	0.032757469	152.9452354	7.11	793.5158386
K41	166.718000		170.747000		4.031	70%			0.030025911	0.032774027	147.8291495	7.60	831.2652635
K42	165.205000		169.157000		3.952	70%			0.030021433	0.032769139	134.27074	7.60	737.8250966
K43	162.938000		165.841000		2.903	70%	137.8	757.4	0.030027933	0.032776234	131.6107895	7.60	723.2035225
K44	172.511000		175.430000		2.919	50%			0.030041555	0.032791103	96.68281871	9.68	688.2137877
K45	175.761000		178.734000		2.973	50%			0.030045573	0.03279658	97.14918143	9.68	691.5896356
K46	184.582000		187.581000		2.999	50%	97.6	695.0	0.030035666	0.032784674	98.68232406	9.68	702.8519957
K47	157.652000		160.307000		2.655	30%			0.03003361	0.032782431	99.85479508	9.87	723.6279963
K48	156.424000		159.032000		2.608	30%			0.030028314	0.03277665	88.41655166	9.87	640.7370124
0	#N/A		#N/A		#N/A	30%	91.7	664.5	0.030045005	0.032794869	86.85311315	9.87	628.6447473
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Technical Service

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Subject:	Emissions measurement report	Pages:	20/46
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Quartz filter- after DPF

WÄRTSILÄ Filter ID		Filter mass (mg) Before measurement Weighing 1	Weighing 2	After measurement Weighing 1	Weighing 2	Mass on Filter (mg)	INFO Before scrubber Quartz			Exhaust filtered m³	Exhaust filtered m³	Calculated values Particle concentration mg/m³	Exhaust flow wet (qmew) cetton method kg/kWh	Particle emission mg/kWh
K63		137.957000		140.215000		2.858								
	K63					2.858	30%			0.030031928	0.032780594	95.16536479	9.76	699.2013137
K64		141.983000		144.804000		2.821								
	K64					2.821	30%			0.030022362	0.032770153	93.98329166	9.76	681.4829519
K65		137.634000		140.402000		2.768								
	K65					2.768	30%		93.77	0.030022967	0.032770813	92.19608448	9.76	668.6650151
K66		142.524000		144.820000		2.296			**680.12**					
	K66					2.296	30%		excluded	0.030036324	0.032788047	76.43825281	9.76	554.3673157
K67		143.510000		146.087000		2.571								
	K67					2.571	30%		excluded	0.030030871	0.032778944	85.63139092	9.76	620.9332669
K68		142.208000		144.933000		2.725								
	K68					2.725	50%		excluded	0.030039197	0.032788528	90.71480691	9.36	629.1802228
K69		143.869000		146.525000		2.656								
	K69					2.656	50%			0.030056836	0.032807782	88.35592139	9.36	612.888854
K70		141.710000		144.413000		2.703								
	K70					2.703	50%			0.030049328	0.032799586	89.58208581	9.36	623.8902486
K71		147.283000		149.854000		2.571								
	K71					2.571	50%		87.97	0.030033952	0.032782803	85.60312667	9.36	593.7286015
K73		145.508000		149.029000		3.523			**610.17**					
	K73					3.523	70%			0.0300322	0.032780891	117.3074251	7.33	632.0068693
K74		146.238000		149.807000		3.569								
	K74					3.569	70%			0.030032906	0.032781664	118.9563111	7.33	649.2375428
K75		143.964000		147.538000		3.574								
	K75					3.574	70%		118.36	0.030048249	0.032798409	118.9420398	7.33	649.8059621
K76		151.844000		155.596000		3.752			**637.68**					
	K76					3.752	85%			0.030047605	0.032797707	124.8685196	7.19	681.8128135
K77		149.650000		153.745000		4.095								
	K77					4.095	85%			0.030034804	0.032783734	136.9418237	7.19	722.6322127
K78		153.512000		157.545000		4.033								
	K78					4.033	85%		135.84	0.030029582	0.032778093	134.3069053	7.19	721.8051872
0		#N/A		#N/A		#N/A			**698.75**					
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0		#N/A		#N/A		#N/A								
	0					#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0		#N/A		#N/A		#N/A								
	0					#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0		#N/A		#N/A		#N/A								
	0					#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0		#N/A		#N/A		#N/A								
	0					#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0		#N/A		#N/A		#N/A								
	0					#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0		#N/A		#N/A		#N/A								
	0					#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
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Technical Service

Title:	Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
		Status:	Approved
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Author:	JCT	Created:	15.8.2017

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Teflon filter- after DPF

WÄRTSILÄ Filter ID	Filter mass (mg) Before measurement Weighing 1	Before measurement Weighing 2	After measurement Weighing 1	After measurement Weighing 2	Mass on Filter (mg)	INFO			Exhaust filtered m³	Exhaust filtered m³	Calculated values: Particle concentration mg/m³	Exhaust flow wet (q_mew) cetion method kg/kWh	Particle emission mg/kWh
K21		172.674000		175.603000	2.929								
K22	K21	179.230000		182.153000	2.923	30%			0.03002296	0.032770805	97.55866861	9.76	702.5589658
K23	K22	176.960000		179.480000	2.520	30%			0.03003804	0.032787266	97.30998428	9.76	705.7550586
K24	K23	148.857000		151.772000	2.915	30%	92.93	674.00	0.090026288	0.032774438	85.62645785	9.76	608.6893008
K25	K24	155.801000		158.415000	2.614	50%	excluded		0.031096851	0.033942984	93.73859487	9.36	650.3582185
K26	K25	147.622000		150.266000	2.644	50%			0.030039282	0.032768621	98.67738999	9.36	643.7278076
K27	K26	172.564000		175.276000	2.712	50%			0.030029302	0.032777728	98.04733499	9.36	639.6791972
K28	K27	162.993000		166.689000	3.696	50%	91.43	628.80	0.030048604	0.032798796	90.25577815	9.36	625.9826578
K29	K28	154.038000		157.563000	3.525	70%	excluded		0.03008889	0.032810024	122.8585527	7.33	662.8463835
K30	K29	158.380000		161.914000	3.534	70%			0.030021936	0.032769687	117.4143484	7.33	632.5733606
K31	K30	163.561000		167.154000	3.593	70%			0.0300262	0.032774342	117.8977108	7.33	634.1068751
K32	K31	181.686000		186.101000	4.415	70%	119.44	637.16	0.030020299	0.032767901	119.9856846	7.33	644.6335864
K33	K32	176.267000		180.146000	3.879	85%			0.031096318	0.033942402	141.9782258	7.19	752.4955807
K34	K33	165.431000		169.390000	3.959	85%			0.0300195	0.032767029	133.5497741	7.19	681.3237472
0	K34	#N/A		#N/A	#N/A	85%	134.12	710.83	0.030033193	0.032781975	131.8208173	7.19	686.666529
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A	#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A

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Appendix 2(6/7)

Quartz filter- after scrubber

WÄRTSILÄ Filter ID	Filter mass (mg) Before measurement Weighing 1	Before measurement Weighing 2	After measurement Weighing 1	After measurement Weighing 2	Mass on Filter (mg)	INFO After scrubber quartz			Exhaust filtered m³	Exhaust filtered m³	Calculated values Particle concentration mg/m³	Exhaust flow wet (q_{mew}) cetion method kg/kWh	Particle emission mg/kWh
K51	119.996000		121.255000		1.259								
K51					1.259	30%			0.030832651	0.033654503	40.83333591	9.94	231.1976027
K52	115.089000		116.230000		1.141								
K52					1.141	30%			0.030846368	0.033669576	36.98976792	9.94	263.7876993
K53	114.430000		115.610000		1.180								
K53					1.18	30%		38.7	0.030851241	0.033674894	38.24805654	9.94	272.7650208
K54	117.257000		118.296000		1.039			**275.9**					
K54					1.039	50%			0.020583575	0.022467483	50.47714804	9.72	352.7003838
K55	114.625000		115.331000		0.706								
K55					0.706	50%			0.020592162	0.022476856	34.28458914	9.72	239.589798
K56	136.747000		137.480000		0.733								
K56					0.733	50%		40.1	0.020580609	0.022464246	35.61604948	9.72	248.6610532
K57	134.418000		136.454000		2.036			**280.4**					
K57					2.036	70%			0.025735664	0.028091116	79.11200574	7.68	488.7895773
K58	134.663000		136.736000		2.053								
K58					2.053	70%			0.025715819	0.028070545	79.83102523	7.68	442.7773895
K59	135.951000		137.872000		1.921								
K59					1.921	70%		77.9	0.025716557	0.028070259	74.6689585	7.68	413.3127087
K60	132.496000		135.399000		2.903			**432.0**					
K60					2.903	85%			0.025739722	0.028095545	112.7828921	6.98	572.3982895
K61	142.007000		144.968000		2.961								
K61					2.961	85%			0.02573059	0.028085577	115.0770899	6.98	584.6416115
K62	139.669000		142.228000		2.559								
K62					2.559	85%		109.1	0.025736635	0.028092175	99.43024844	6.98	504.6306771
0	#N/A		#N/A		#N/A			**553.7**					
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	#N/A	0	#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A

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Appendix 2(7/7)

Teflon filter- after scrubber

WÄRTSILÄ Filter ID		Filter mass (mg) Before measurement Weighing 1	Weighing 2	After measurement Weighing 1	Weighing 2	Mass on Filter (mg)	INFO Part 3			Exhaust filtered m³	Exhaust filtered m³	Calculated values Particle concentration mg/m³	Exhaust flow wet (qmew) cetion method kg/kWh	Particle emission mg/kWh
K04		170.946000		172.636000		1.693								
	K04					1.693	30%			0.030847447	0.033670753	56.88296654	9.94	581.3908569
K05		173.004000		174.560000		1.556								
	K05					1.556	30%			0.030855696	0.033679757	50.42828054	9.94	559.6227693
K06		165.065000		166.713000		1.648								
	K06					1.648	30%	52.9		0.030842695	0.033665567	53.43242502	9.94	531.0453612
K07		171.234000		172.360000		1.126		377.4						
	K07					1.126	50%	excluded		0.020553474	0.022478288	54.67753496	9.72	532.0497787
K08		176.218000		177.476000		1.258								
	K08					1.258	50%			0.020589786	0.022474262	61.09825517	9.72	428.9136064
K09		176.036000		177.196000		1.16								
	K09					1.16	50%			0.02057825	0.02246167	56.37016754	9.72	593.6771125
K10		164.471000		165.637000		1.166								
	K10					1.166	50%	58.0		0.020573073	0.02245602	56.67602413	9.72	595.0140238
K11		163.268000		165.742000		2.474		405.6						
	K11					2.474	70%	excluded		0.02573838	0.028094283	96.12108589	7.68	533.1288512
K12		174.538000		176.807000		2.269								
	K12					2.269	70%			0.025715798	0.028069431	88.2337032	7.68	463.3622427
K13		173.772000		176.067000		2.295								
	K13					2.295	70%			0.025715218	0.028068798	89.24676475	7.68	465.0011309
K14		175.984000		178.373000		2.389								
	K14					2.389	70%	90.1		0.025722086	0.028076295	92.87736028	7.68	535.1330939
K15		168.953000		170.241000		3.288		499.8						
	K15					3.288	85%	excluded		0.026604826	0.029039804	123.5866896	6.98	622.2309523
K16		164.327000		167.276000		2.949								
	K16					2.949	85%			0.025728123	0.028082885	110.7348536	6.98	562.0690726
K17		170.872000		173.768000		2.896								
	K17					2.896	85%			0.025742063	0.0280981	112.9065661	6.98	570.9661126
K18		167.852000		170.895000		3.043								
	K18					3.043	85%	113.8		0.025735657	0.028091108	118.3406184	6.98	600.0874982
0		#N/A		#N/A		#N/A		577.7						
0	0	#N/A		#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
0	0	#N/A		#N/A		#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A
	0					#N/A				#REF!	#REF!	#N/A	#DIV/0!	#N/A

VPS

TEST REPORT

From : Veritas Petroleum Services (Asia) Pte Ltd
Our ref. : HR160927
Name : WARTSILA TECHNICAL SERVICE

Sample Information

Sample number : SNG1722408
Product type : Heavy Fuel Oil
Description : Crown Princess Installation /Emission calculation
Sampling date : 09-Jun-2017
Sample container : VPS
Seal data : 0771079, Intact

Test Results

Test	Unit	Method	SNG1722408
Density @ 15°C	kg/m³	ISO 12185	988.3
Viscosity @ 50°C	mm²/s	ISO 3104	337.7
Viscosity @ 80°C	mm²/s	ISO 3104	72.05
Water	% V/V	ASTM D6304-C	<0.01
Micro Carbon Residue	% m/m	ISO 10370	14.98
Sulfur	% m/m	ISO 8754	2.32
Total Sediment Potential	% m/m	ISO 10307-2	<0.01
Total Sediment Existent	% m/m	ISO 10307-1	0.01
Ash	% m/m	LP 1001	0.044
Vanadium	mg/kg	IP 501	83
Sodium	mg/kg	IP 501	37
Aluminium	mg/kg	IP 501	7
Silicon	mg/kg	IP 501	5
Iron	mg/kg	IP 501	29
Nickel	mg/kg	IP 501	31
Calcium	mg/kg	IP 501	8
Magnesium	mg/kg	LP 1101	1
Lead	mg/kg	LP 1101	<1
Zinc	mg/kg	IP 501	2
Phosphorus	mg/kg	IP 501	<1
Potassium	mg/kg	LP 1101	<1
Flash Point	°C	ISO 2719-B	>70.0
Pour Point	°C	ISO 3016	<-6
Asphaltene	% m/m	ASTM D3279	6.0
Acid Number	mg KOH/g	ASTM D664	0.36
Strong Acid Number	mg KOH/g	ASTM D664	0.00
Carbon	% m/m	ASTM D5291	87.0
Hydrogen	% m/m	ASTM D5291	10.4
Nitrogen	% m/m	ASTM D5291	0.52
Oxygen	% m/m	ASTM D5291 Ext	<0.2

Calculated Results

Aluminium + Silicon	Mg/Kg	-	12
Net Specific Energy	MJ/kg	ISO 8217	40.48
Calculated Carbon Aromaticity Index	-	ISO 8217	850

WÄRTSILÄ

Technical Service

Title:	Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
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Subject:	Emissions measurement report	Pages:	25/46
Author:	JCT	Created:	15.8.2017

Appendix 4(1/3)

Gaseous components / after engine

NO_x calculation sheet for EIAPP Certification, AFTER ENGINE

Information sources: Wärtsilä; Measured; Calculated; Analysed; EIAPP values

Carbon balance method — **Date of preliminary calculatio** 30.6.2017 — **Final Calculations** -

Fuel type	HFO		**Engine type**		W12V46	**D**	0.46	m
Fuel Elementary Analysis			**Engine number**			**S**	0.58	m
Carbon	87	m-%	**Test Cycle**		**E2**	**n**	8.566667	rounds/s
Hydrogen	10.4	m-%	**Speed**	514	rpm	**cyl.**	12	pcs.
Sulphur	2.32	m-%	**NOx limit**	10.47	g/kWh	**j**	2	4-stroke
Nitrogen	0.52	m-%	f_{nd}	-0.57				
Oxygen	0.2	m-%	**α**	1.42	molar ratio			
	100.44	m-%	f_a	**0,93-1,07**		p_r	0.76	kPa

NO_x measured on wet basis (=1) or on dry basis (=0) — 0 — 1 or 0

Test Code						
Power	**85%**	**70%**	**50%**	**30%**		Percentage of engine nominal power, shaft
speed	100%	100%	100%	100%		Percentage of engine nominal speed, shaft
R_a	85	92	98	94	%	Relative humidity of the intake air
$T_{a,\,out}$	23.5	22.9	20.6	21.3	°C	Temperature of the air in the point of relative humidity measurement
p_a	2.89	2.79	2.43	2.53	kPa	Saturation vapour pressure of the engine intake air
p_b	100.9	100.9	101.7	100.8	kPa	Total barometric pressure
T_a	23.5	22.9	20.6	21.3	°C	Intake air temperature determined at the engine intake
T_a	296.5	295.9	293.6	294.3	K	Intake air temperature determined at the engine intake
p_e	2107.2	1762.0	1213.0	789.2	kPa	Break mean effective pressure
T_{SC}	62	60	54	49	°C	Measured air receiver temperature
T_{SCRef}	62	60	54	49	°C	Reference (nominal) air receiver temperature
$P_{c,\,over}$	310	270	180	80	kPa	Charge air pressure; Overpressure in the air receiver
P_{sc}	21.29	19.50	14.84	11.67	kPa	Saturation vapour pressure of charge air in the air receiver conditions
CO_2	6.35	6.02	4.98	4.95	%-v	Measured exhaust CO_2; dry basis
O_2	12.58	13.05	14.48	14.53	%-v	Measured exhaust O_2; dry basis
HC	60	60	60	60	ppmv	Measured hydrocarbons as C1; wet basis
CO	49	51	63	109	ppmv	Measured exhaust CO; dry basis
NO_x	1367	1026	837	1160	ppmv	Measured exhaust NOx; dry basis
SO2	529	529	442	420	ppmv	Measured exhaust SO2; dry basis
P	10440.0	8730.0	6010.0	3910.0	kW	Engine power, shaft
SFC	203.53	206.49	219.53	222.68	g/kWh	Measured actual specific fuel oil consumption
q_{mf}	2124.85	1802.66	1319.38	870.68	kg/h	Actual fuel mass flow rate
f_c	3.44	3.27	2.70	2.69	-	Carbon factor
c_{H2d}	0.001	0.001	0.001	0.003	-	
q_{maw}	71968.05	64383.19	56711.42	37620.28	kg/h	Intake air mass flow rate on wet basis
SAC	6.89	7.37	9.44	9.62	kg/kWh	Specific air consumption - dry intake air
q_{mew}	74092.91	66185.84	58030.80	38490.96	kg/h	Exhaust mass flow rate; wet
H_{SC}	33.98	34.52	34.59	42.94	g/kg	Absolute humidity of charging air in receiver at saturated condition
H_a	15.55	16.25	14.89	15.04	g/kg	Absolute humidity of intake air
K_{w2}	0.02	0.03	0.02	0.02	-	
K_{wa}	0.98	0.97	0.98	0.98	-	Dry to wet correction factor for intake air
k_{wr}	0.94	0.94	0.95	0.95	-	Dry to wet correction factor for raw exhaust gas
k_{hd}	1.06	1.06	1.04	1.04	-	Humidity correction factor for NOx for diesel engines
f_0	**1.00**	**0.99**	**0.98**	**0.99**	-	Test Condition parameter - validity test: acceptable area 0,93-1,07
W_{F1}	0.2	0.5	0.15	0.15	-	Weighting factor for the E2 test cycle
$NO_{x,\,wet}$	1287.06	967.17	796.08	1103.30	ppm	Exhaust NO_x; wet basis
$NO_{x\,iso\,corr}$	1360	1030	828	1151	ppm	Exhaust NO_x; wet basis - corrected for intake air temperature, humidity and receiver temp.
u_{NOx}	0.001587	0.001587	0.001587	0.001587	NO_x factor	Ratio between density of exhaust component and density of exhaust gas
q_{mNOx}	159965	108149	76212	70337	g/h	NO_x emission mass flow rate
NO_x	15.3	12.4	12.7	18.0	g/kWh	Calculated NO_x specific emissions

Table of specific emission values

NO_x	15.3	12.4	12.7	18.0	g/kWh	Specific NO_x emissions
SO_2	9.4	9.6	10.2	10.3	g/kWh	Specific SO2 emissions
CO	0.3	0.4	0.6	1.0	g/kWh	Specific CO emissions
CO_2	643.7	652.7	693.8	703.1	g/kWh	Specific CO_2 emissions
O_2	927.2	1028.7	1466.8	1500.6	g/kWh	Specific O_2 emissions
THC	0.2	0.2	0.3	0.3	g/kWh	Specific THC emissions as C1

Additional calculations

CO_2	6.35	6.02	4.98	4.95	%-v	Measured exhaust CO_2; dry basis
O_2	12.58	13.05	14.48	14.53	%-v	Measured exhaust O_2; dry basis
u_{HC}	0.000479	0.000479	0.000479	0.000479		HC calculation factor
u_{CO}	0.000966	0.000966	0.000966	0.000966		CO calculation factor
u_{CO2}	15.17	15.17	15.17	15.17		CO_2 calculation factor
u_{O2}	11.03	11.03	11.03	11.03		O_2 calculation factor
q_{mHC}	2.13	1.90	1.67	1.11	kg/h	HC emission mass flow rate as C1
q_{mCO}	3.30	3.07	3.36	3.85	kg/h	CO emission mass flow rate
q_{mCO2}	6719.96	5697.74	4169.69	2749.08	kg/h	CO_2 emission mass flow rate
q_{mO2}	9679.74	8980.62	8815.22	5867.29	kg/h	O_2 emission mass flow rate
q_{mSO2}	98.59	83.64	61.22	40.40	kg/h	SO_2 emission mass flow rate

Calibration check of emission measurement equipment

	CO	CO_2	THC	O_2	NO_x			
Range	500	10	0	25	2500	Measuring range (scale)		
Deviation	9.4	0.19	0.0	0.45	47.6	Maximum allowed deviation value, absolute		
Zero-gas,i	0	0	0	0	0	0-gas value before the measurements		
Span-gas, i	471	9.53	0	22.5	2380	span-gas value before the measurements		
Zero-gas,a	0	0.1	0	0.2	2	0-gas value after the measurements		
Span-gas,a	474	9.52	0	22.6	2372	span-gas value after the measurements		
Deviation	0.00	1.05	#DIV/0!	0.89	0.08	%	0-gas	Deviation of span gas value
	0.64	0.10	#DIV/0!	0.44	0.34	%	span-gas	Deviation of span gas value
			Maximum deviaton		2.00%	Maximum allowed deviation of span gas value		

WÄRTSILÄ Technical Service				
	Title:	Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
			Status:	Approved
			Checked:	TSu
	Subject:	Emissions measurement report	Pages:	26/46
	Author:	JCT	Created:	15.8.2017

Appendix 4(2/3)

Gaseous components / after DPF

NO_x calculation sheet for EIAPP Certification, AFTER FILTER

Information sources: Wärtsilä; Measured; Calculated; Analysed; EIAPP values

Carbon balance method			Date of preliminary calculatio		30.6.2017	Final Calculations		-
Fuel type	HFO		Engine type		W12V46	D	0.46	m
Fuel Elementary Analysis			Engine number			S	0.58	m
Carbon	87	m-%	Test Cycle		E2	n	8.566667	rounds/s
Hydrogen	10.4	m-%	Speed	514	rpm	cyl.	12	pcs.
Sulphur	2.32	m-%	NOx limit	10.47	g/kWh	j	2	4-stroke
Nitrogen	0.52	m-%	f_{fd}	-0.57				
Oxygen	0.2	m-%	α	1.42	molar ratio			
	100.44	m-%	f_a	0,93-1,07		p_r	0.76	kPa
NO_x measured on wet basis (=1) or on dry basis (=0)					0	1 or 0		

Test Code						
Power	85%	70%	50%	30%		Percentage of engine nominal power, shaft
speed	100%	100%	100%	100%		Percentage of engine nominal speed, shaft
R_a	98	97	98	97	%	Relative humidity of the intake air
$T_{a,out}$	20.4	20.8	19.9	19.8	°C	Temperature of the air in the point of relative humidity measurement
p_a	2.40	2.46	2.32	2.31	kPa	Saturation vapour pressure of the engine intake air
p_b	101.7	101.7	101.3	101.3	kPa	Total barometric pressure
T_a	20.4	20.8	19.9	19.8	°C	Intake air temperature determined at the engine intake
T_a	293.4	293.8	292.9	292.8	K	Intake air temperature determined at the engine intake
p_e	2052.7	1717.6	1243.3	752.9	kPa	Break mean effective pressure
T_{SC}	63	59	57	51	°C	Measured air receiver temperature
T_{SCRef}	63	59	57	51	°C	Reference (nominal) air receiver temperature
$P_{c,over}$	310	270	200	70	kPa	Charge air pressure; Overpressure in the air receiver
P_{sc}	22.23	18.65	17.05	12.87	kPa	Saturation vapour pressure of charge air in the air receiver conditions
CO_2	6.30	6.03	4.96	5.00	%-v	Measured exhaust CO_2; dry basis
O_2	12.69	13.04	14.5	14.44	%-v	Measured exhaust O_2; dry basis
HC	60	60	60	60	ppmv	Measured hydrocarbons as C1; wet basis
CO	29	32	50	71	ppmv	Measured exhaust CO; dry basis
NO_x	1332	1051	849	1184	ppmv	Measured exhaust NOx; dry basis
SO2	516	523	461	461	ppmv	Measured exhaust SO2; dry basis
P	10170.0	8510.0	6160.0	3730.0	kW	Engine power, shaft
SFC	204.27	199.53	211.45	222.30	g/kWh	Measured actual specific fuel oil consumption
q_{mf}	2077.43	1698.85	1302.53	829.18	kg/h	Actual fuel mass flow rate
f_c	3.42	3.27	2.69	2.71	-	Carbon factor
c_{H2d}	0.001	0.001	0.001	0.002	-	
q_{maw}	70872.52	60516.19	56192.09	35465.92	kg/h	Intake air mass flow rate on wet basis
SAC	6.97	7.11	9.12	9.51	kg/kWh	Specific air consumption - dry intake air
q_{mew}	72949.95	62215.04	57494.62	36295.09	kg/h	Exhaust mass flow rate; wet
H_{SC}	35.50	32.87	37.30	50.52	g/kg	Absolute humidity of charging air in receiver at saturated condition
H_a	14.70	14.92	14.30	14.06	g/kg	Absolute humidity of intake air
K_{w2}	0.02	0.02	0.02	0.02	-	
K_{wa}	0.98	0.98	0.98	0.98	-	Dry to wet correction factor for intake air
k_{wr}	0.94	0.94	0.95	0.95	-	Dry to wet correction factor for raw exhaust gas
k_{hd}	1.04	1.04	1.03	1.03	-	Humidity correction factor for NOx for diesel engines
f_a	**0.97**	**0.98**	**0.97**	**0.97**	-	Test Condition parameter - validity test: acceptable area 0,93-1,07
W_{Fi}	0.2	0.5	0.15	0.15	-	Weighting factor for the E2 test cycle
$NO_{x,wet}$	1256.01	992.52	808.32	1127.35	ppm	Exhaust NO_x; wet basis
$NO_{x,iso\ corr}$	1302	1033	832	1157	ppm	Exhaust NO_x; wet basis - corrected for intake air temperature, humidity
u_{NOx}	0.001587	0.001587	0.001587	0.001587	NO_x factor	Ratio between density of exhaust component and density of exhaust gas
q_{mNOx}	150718	101968	75960	66662	g/h	NO_x emission mass flow rate
NO_x	**14.8**	**12.0**	**12.3**	**17.9**	g/kWh	Calculated NO_x specific emissions

Table of specific emission values						
NO_x	14.8	12.0	12.3	17.9	g/kWh	Specific NO_x emissions
SO_2	9.5	9.3	9.8	10.3	g/kWh	Specific SO2 emissions
CO	0.2	0.2	0.4	0.6	g/kWh	Specific CO emissions
CO_2	646.4	631.5	668.6	702.8	g/kWh	Specific CO_2 emissions
O_2	946.7	993.0	1421.2	1475.7	g/kWh	Specific O_2 emissions
THC	0.2	0.2	0.3	0.3	g/kWh	Specific THC emissions as C1
Additional calculations						
CO_2	6.3	6.03	4.96	5	%-v	Measured exhaust CO_2; dry basis
O_2	12.69	13.04	14.5	14.44	%-v	Measured exhaust O_2; dry basis
u_{HC}	0.000479	0.000479	0.000479	0.000479		HC calculation factor
u_{CO}	0.000966	0.000966	0.000966	0.000966		CO calculation factor
u_{CO2}	15.17	15.17	15.17	15.17		CO_2 calculation factor
u_{O2}	11.03	11.03	11.03	11.03		O_2 calculation factor
q_{mHC}	2.10	1.79	1.65	1.04	kg/h	HC emission mass flow rate as C1
q_{mCO}	1.93	1.82	2.64	2.37	kg/h	CO emission mass flow rate
q_{mCO2}	6574.15	5374.48	4118.81	2621.26	kg/h	CO_2 emission mass flow rate
q_{mO2}	9628.32	8450.59	8754.83	5504.24	kg/h	O_2 emission mass flow rate
q_{mSO2}	96.39	78.83	60.44	38.47	kg/h	SO_2 emission mass flow rate

Calibration check of emission measurement equipment

	CO	CO_2	THC	O_2	NO_x			
Range	500	10	0	25	2500	Measuring range (scale)		
Deviation	9.4	0.19	0.0	0.45	47.6	Maximum allowed deviation value, absolute		
Zero-gas,i	0	0	0	0	0	0-gas value before the measurements		
Span-gas, i	471	9.53	0	22.5	2380	span-gas value before the measurements		
Zero-gas,a	0	0.01	0	0.05	2	0-gas value after the measurements		
Span-gas,a	474	9.52	0	22.6	2372	span-gas value after the measurements		
Deviation	0.00	0.10	#DIV/0!	0.22	0.08	%	0-gas	Deviation of span gas value
	0.64	-0.10	#DIV/0!	0.44	-0.34	%	span-gas	Deviation of span gas value
			Maximum deviaton		2.00%	Maximum allowed deviation of span gas value		

WÄRTSILÄ

Technical Service

Title:	Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
		Status:	Approved
		Checked:	TSu
Subject:	Emissions measurement report	Pages:	27/46
Author:	JCT	Created:	15.8.2017

Appendix 4(3/3)

Gaseous components / after scrubber

NO_x calculation sheet for EIAPP Certification, AFTER SCRUBBER

Information sources: Wärtsilä; Measured; Calculated; Analysed; EIAPP values

Carbon balance method			**Date of preliminary calculatio**		30.6.2017	**Final Calculations**		-
Fuel type	HFO		**Engine type**		W12V46	**D**	0.46	m
Fuel Elementary Analysis			**Engine number**			**S**	0.58	m
Carbon	87	m-%	**Test Cycle**		**E2**	**n**	8.566667	rounds/s
Hydrogen	10.4	m-%	**Speed**	514	rpm	**cyl.**	12	pcs.
Sulphur	2.32	m-%	**NOx limit**	10.47	g/kWh	**j**	2	4-stroke
Nitrogen	0.52	m-%	f_{rd}	-0.57				
Oxygen	0.2	m-%	**α**	1.42	molar ratio			
	100.44	m-%	**f_a**	**0,93-1,07**		**p_r**	0.76	kPa

NO_x measured on wet basis (=1) or on dry basis (=0): 0 (1 or 0)

Test Code						
Power	**85%**	**70%**	**50%**	**30%**		Percentage of engine nominal power, shaft
speed	100%	100%	100%	100%		Percentage of engine nominal speed, shaft
R_s	89	92	94	95	%	Relative humidity of the intake air
$T_{a,\ out}$	23	23	23	23	°C	Temperature of the air in the point of relative humidity measurement
p_a	2.81	2.81	2.81	2.81	kPa	Saturation vapour pressure of the engine intake air
p_b	101	100.9	100.9	100.8	kPa	Total barometric pressure
T_a	23	23	23	23	°C	Intake air temperature determined at the engine intake
T_a	296	296	296	296	K	Intake air temperature determined at the engine intake
p_e	2036.5	1715.6	1267.5	760.9	kPa	Break mean effective pressure
T_{SC}	62	59	57	50	°C	Measured air receiver temperature
T_{SCRef}	62	59	57	50	°C	Reference (nominal) air receiver temperature
$P_{c,\ over}$	300	260	200	80	kPa	Charge air pressure; Overpressure in the air receiver
P_{sc}	21.29	18.65	17.05	12.26	kPa	Saturation vapour pressure of charge air in the air receiver conditions
CO_2	6.39	6.04	4.99	4.99	%-v	Measured exhaust CO_2; dry basis
O_2	12.65	13.11	14.52	14.47	%-v	Measured exhaust O_2; dry basis
HC	60	60	60	60	ppmv	Measured hydrocarbons as C1; wet basis
CO	31	37	50	68	ppmv	Measured exhaust CO; dry basis
NO_x	1293	1021	852	1130	ppmv	Measured exhaust NOx; dry basis
SO2	17	16	10	8	ppmv	Measured exhaust SO2; dry basis
P	10090.0	8500.0	6280.0	3770.0	kW	Engine power, shaft
SFC	**200.79**	**209.28**	**220.32**	**225.45**	g/kWh	Measured actual specific fuel oil consumption
q_{mf}	2025.97	1778.88	1383.61	849.95	kg/h	Actual fuel mass flow rate
f_c	3.47	3.28	2.70	2.71	-	Carbon factor
c_{H2d}	0.001	0.001	0.001	0.002	-	
q_{maw}	68232.04	63347.83	59476.81	36530.67	kg/h	Intake air mass flow rate on wet basis
SAC	6.76	7.45	9.47	9.69	kg/kWh	Specific air consumption - dry intake air
q_{mew}	70258.01	65126.71	60860.42	37380.62	kg/h	Exhaust mass flow rate; wet
H_{SC}	34.87	33.90	37.35	45.24	g/kg	Absolute humidity of charging air in receiver at saturated condition
H_a	15.78	16.35	16.71	16.91	g/kg	Absolute humidity of intake air
K_{w2}	0.02	0.03	0.03	0.03	-	
K_{wa}	0.98	0.97	0.97	0.97	-	Dry to wet correction factor for intake air
k_{wr}	0.94	0.94	0.95	0.95	-	Dry to wet correction factor for raw exhaust gas
k_{hd}	1.06	1.07	1.07	1.07	-	Humidity correction factor for NOx for diesel engines
f_a	**0.99**	**0.99**	**1.00**	**1.00**	-	Test Condition parameter - validity test: acceptable area 0,93-1,07
$W_{F,i}$	0.2	0.5	0.15	0.15	-	Weighting factor for the E2 test cycle
$NO_{x,\ wet}$	1216.65	962.19	808.19	1071.59	ppm	Exhaust NO_x; wet basis
$NO_{x\ iso\ corr}$	1288	1026	866	1151	ppm	Exhaust NO_x; wet basis - corrected for intake air temperature, humidity and receiver temp.
u_{NOx}	0.001587	0.001587	0.001587	0.001587	NO_x factor	Ratio between density of exhaust component and density of exhaust gas
q_{mNOx}	143611	106039	83623	68276	g/h	NO_x emission mass flow rate
NO_x	**14.2**	**12.5**	**13.3**	**18.1**	g/kWh	Calculated NO_x specific emissions

Table of specific emission values						
NO_x	14.2	12.5	13.3	18.1	g/kWh	Specific NO_x emissions
SO_2	9.3	9.7	10.2	10.5	g/kWh	Specific SO2 emissions
CO	0.2	0.3	0.4	0.6	g/kWh	Specific CO emissions
CO_2	635.1	661.6	695.9	711.8	g/kWh	Specific CO_2 emissions
O_2	914.2	1044.1	1472.3	1500.7	g/kWh	Specific O_2 emissions
THC	0.2	0.2	0.3	0.3	g/kWh	Specific THC emissions as C1
Additional calculations						
CO_2	6.39	6.04	4.99	4.99	%-v	Measured exhaust CO_2; dry basis
O_2	12.65	13.11	14.52	14.47	%-v	Measured exhaust O_2; dry basis
u_{HC}	0.000479	0.000479	0.000479	0.000479		HC calculation factor
u_{CO}	0.000966	0.000966	0.000966	0.000966		CO calculation factor
u_{CO2}	15.17	15.17	15.17	15.17		CO_2 calculation factor
u_{O2}	11.03	11.03	11.03	11.03		O_2 calculation factor
q_{mHC}	2.02	1.87	1.75	1.07	kg/h	HC emission mass flow rate as C1
q_{mCO}	1.98	2.19	2.79	2.33	kg/h	CO emission mass flow rate
q_{mCO2}	6408.39	5623.65	4370.16	2683.38	kg/h	CO_2 emission mass flow rate
q_{mO2}	9224.19	8875.11	9245.98	5657.71	kg/h	O_2 emission mass flow rate
q_{mSO2}	94.01	82.54	64.20	39.44	kg/h	SO_2 emission mass flow rate

Calibration check of emission measurement equipment

	CO	CO_2	THC	O_2	NO_x			
Range	500	10	0	25	2500	Measuring range (scale)		
Deviation	9.4	0.19	0.0	0.45	47.6	Maximum allowed deviation value, absolute		
Zero-gas,i	0	0	0	0	0	0-gas value before the measurements		
Span-gas, i	471	9.53	0	22.5	2380	span-gas value before the measurements		
Zero-gas,a	0	0.02	0	0.05	1	0-gas value after the measurements		
Span-gas,a	471	9.56	0	22.5	2370	span-gas value after the measurements		
Deviation	0.00	0.21	#DIV/0!	0.22	0.04	%	0-gas	Deviation of span gas value
	0.00	0.31	#DIV/0!	0.00	-0.42	%	span-gas	Deviation of span gas value
			Maximum deviaton		2.00%	Maximum allowed deviation of span gas value		

Appendix 5 (1/1)

EC/OC analysis results

VTT

CUSTOMER REPORT VTT-CR-04444-17
Appendix 1

OC/EC results.

Sample ID	TC µg/sample filter	OC µg/sample filter	EC µg/sample filter	EC/TC ratio
K51	520.9	349.8	171.1	0.33
K52	507.0	332.0	175.0	0.35
K53	519.5	347.3	172.2	0.33
K54	239.3	170.3	69.0	0.29
K55	237.3	169.6	67.8	0.29
K56	237.6	172.8	64.8	0.27
K57	269.4	180.2	89.2	0.33
K58	287.8	198.4	89.3	0.31
K59	284.3	195.7	88.7	0.31
K60	240.9	164.4	76.5	0.32
K61	234.3	161.3	73.0	0.31
K62	231.0	163.5	67.5	0.29
K63	896.3	685.8	210.5	0.23
K64	897.1	681.4	215.6	0.24
K65	908.8	694.2	214.6	0.24
K69	500.2	374.6	125.6	0.25
K70	495.9	363.1	132.9	0.27
K71	507.6	376.6	131.0	0.26
K72	16.9	16.9	0.0	0.00
K73	436.3	322.0	114.2	0.26
K74	456.4	330.5	125.9	0.28
K75	430.2	317.4	112.8	0.26
K76	355.7	227.2	128.5	0.36
K77	345.2	209.4	135.9	0.39
K78	353.7	213.6	140.1	0.40
K79	437.3	297.6	139.6	0.32
K80	456.1	314.5	141.6	0.31
K81	456.1	308.5	147.6	0.32
K82	571.3	408.3	163.1	0.29
K83	555.4	390.8	164.6	0.30
K84	571.0	408.7	162.3	0.28
K85	558.4	432.9	125.4	0.22
K86	533.2	420.0	113.2	0.21
K87	555.5	434.3	121.2	0.22
K88	878.7	668.0	210.7	0.24
K89	879.7	660.0	219.7	0.25

Appendix 6 (1/1)

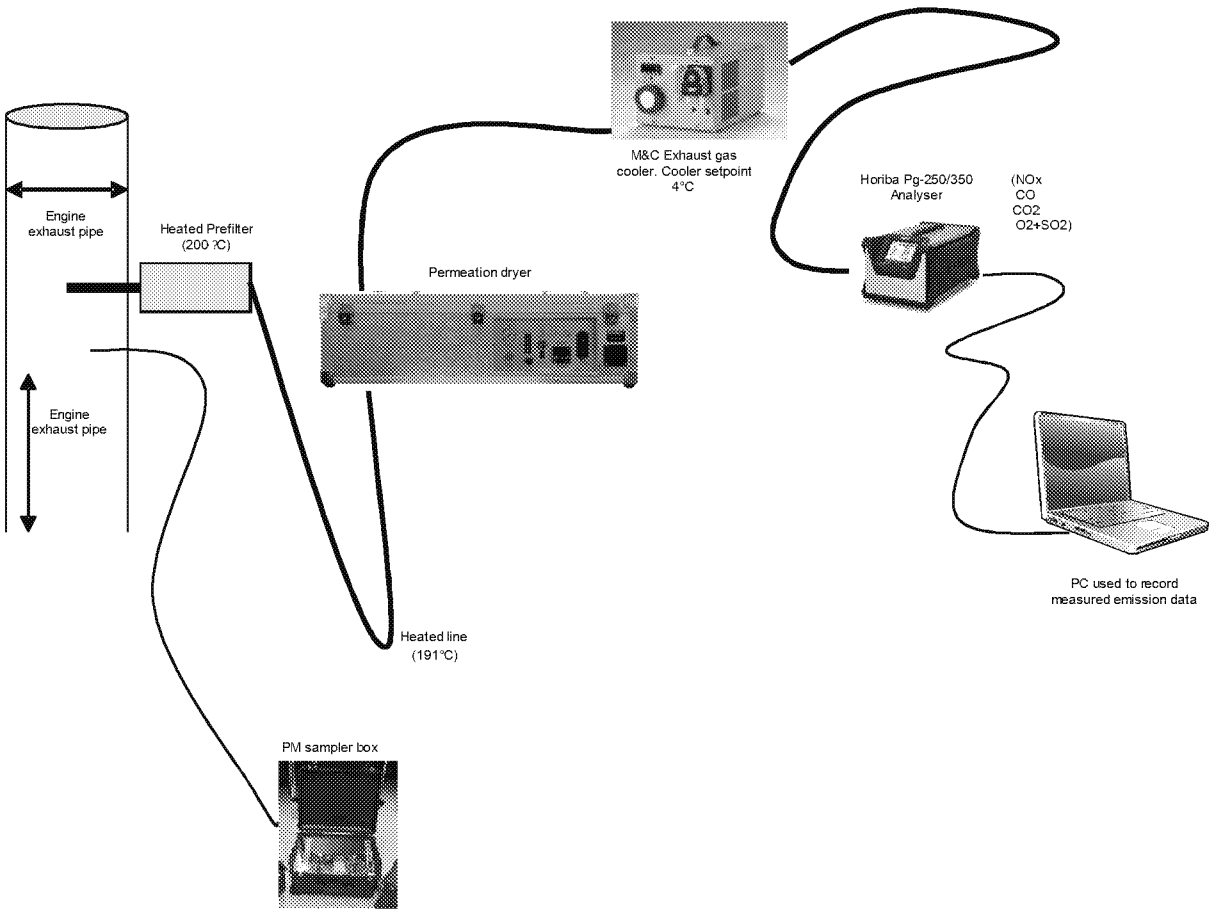
SO_4 results.

Customer Sample ID	SO4 mg/sample filter 204R
K04	0.57
K05	0.55
K06	0.55
K08	0.50
K09	0.49
K10	0.50
K12	1.08
K13	1.06
K14	1.15
K16	1.47
K17	1.45
K18	1.52
K21	0.95
K22	0.80
K23	0.85
K25	1.13
K26	1.13
K27	1.16
K29	1.64
K30	1.61
K31	1.64
K32	2.10
K33	1.84
K34	1.91
K37	2.13
K38	2.16
K39	2.17
K40	1.99
K41	1.84
K42	1.79
K43	1.24
K44	1.29
K45	1.27
K46	1.00
K47	0.89
K48	0.89

WÄRTSILÄ Technical Service	Title: Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
		Status:	Approved
		Checked:	TSu
	Subject: Emissions measurement report	Pages:	30/46
	Author: JCT	Created:	15.8.2017

Appendix 7 (1/1).

Emission Measurement equipment setup



WÄRTSILÄ Technical Service				
			Doc.ID:	DBAE542919
	Title:	Crown Princess, W12V46 + Scrubber	Status:	Approved
			Checked:	TSu
	Subject:	Emissions measurement report	Pages:	31/46
	Author:	JCT	Created:	15.8.2017

Appendix 8(1/2).

Gas bottle certificate

A Member of The Linde Group | AGA HiQ® Certificate.

Kundnamn/Customer name
AGA SPG INTERNT
-
BALTZAR VON PLATENS GATA 4-6
74547 ENKÖPING

Utskriftsdatum/ Date of issue 2016-10-28
Analysnr/ Certificate number 100438205
Flasknr/ Cylinder number 7520000389311
Ordernr/ Order number 2016196603
Sidnr/ Page number Page 1 of 1
Materialnr/ Material number 714039

Analyscertifikat/Certificate of analysis

Certified standard

Configurable spg HiQ® Produktnummer N/A

Flaska/Cylinder

Flasktyp Cylinder type	Ventilanslutning Valve connection	Fyllningstryck Cylinder pressure (15 °C)	Gasvolym Gas volume (15 °C, 1,013 bar)
OTM-10	SS-DIN 8	150 bar	1,5m³

Komponent Component		Beställd Halt Ordered	Analyserad Halt Analysis result	Enhet Unit	Analysosäkerhet Uncertainty % Rel.
Kolmonoxid/Carbon monoxide	CO	475,000	471	vol-ppm	± 1,0
Koldioxid/Carbon dioxide	CO2	9,500	9,53	vol-%	± 1,0
Kvävemonoxid/Nitric oxide	NO	2 375,000	2380	vol-ppm	± 1,0
Kväveoxider/Nitric oxides	NOx	2 975,000	2380	vol-ppm	± 1,0
Svaveldioxid/Sulfur dioxide	SO2	950,000	957	vol-ppm	± 1,0
Nitrogen/Nitrogen	N2	Grundgas/q.s			

Rekommenderad lager- och användningstemperatur / Recommended storage and usage temperature -20 °C till/to +40°C
Lägsta användningstryck / Minimum utilization 5 bar
Används före (ÅÅÅÅ-MM-DD) / Use before 2018-10-25

Konfidensnivå / Confidence level 95 %
Blandningstolerans / Blend tolerance 5,0 % relativt/relative

Kommentarer / Comments

Anläggning/Site **Enköping**

Analysansvarig/*Responsible for the analysis*
Linde Subsidiary

AGA Gas AB

Certifikatet får ej återges annat än i sin helhet utan skriftligt tillstånd från laboratoriet /
The certificate shall not be reproduced except in full, without the written approval of the laboratory

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Huvudkontor / Head Office Org nr / Reg No 556069-8119
AGA Gas AB
181 81 LIDINGÖ
Sweden

Företaget säljer i kommission för AGA AB/
The company operates on behalf of AGA AB
VAT No SE663000058301

Appendix 8(2/2).

KALIBRERINGSBEVIS

utfärdat av ackrediterat laboratorium

CALIBRATION CERTIFICATE issued by an Accredited Laboratory

SWEDAC ACKREDITERING 5396 ISO/IEC 17025

A Member of The Linde Group | AGA

Kund / *Customer*
OY AGA AB
KLT 4501186636
Itschallintokuja 6
02600 ESPOO

Utskriftsdatum / *Date of issue:* 2015-02-02
Analysnr / *Analysis number.:* 100363533
Flasknr / *Cylinder number.:* 7521000049246
Ordernr / *Order number.:* 2013913460
Sidnr / *Page number.:* Page 1 of 1
Materialnr / *Material number* 714039

Flaska / *Cylinder*

Flasktyp *Cylinder type*	Ventilanslutning *Valve connection*	Fyllningstryck *Filling pressure* (15 °C)	Gasvolym *Gas volume* (15 °C, 1,013 bar)
OTC-10	BR-DIN 10	150 bar	1,5 m^3

Komponent *Component*		Beställd halt *Ordered*	Analyserad halt *Analysis result*	Enhet *Unit*	Osäkerhet *Uncertainty* % rel.
Oxygen/Oxygen	O_2	22,500	22,5	vol-%	± 1,0
Nitrogen/Nitrogen	N_2	Grundgas/q.s			

Rekommenderad lager- och användningstempratur/ *Recommended storage and usage temperature* -20 °C till/to +40 °C

Lägsta användningstryck / *Minimum utilization pressure* 5 bar
Används före (ÅÅÅÅ-MM-DD) / *Use before (YYYY-MM-DD)* 2018-01-30
Konfidensnivå / *Confidence level* 95 %
Blandningstolerans / *Blend tolerance* 5,0 % relativt/relative

Kommentarer / *Comments:*
Analysis according to internal method SE-16-0220 based on ISO6143.
The reported concentration is traceable to VSL Standard Reference Material certificate nr 3222528.
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA-4/02.

Anläggning / *Site:* Enköping

Analysansvarig / *Responsible for the analysis*

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WÄRTSILÄ

Technical Service

Title:	Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
		Status:	Approved
		Checked:	TSu
Subject:	Emissions measurement report	Pages:	33/46
Author:	JCT	Created:	15.8.2017

Appendix 9 (1/1)

Operation data

Place: Crown Princess June 2017

Date	Time	Scrubber bef/aft	Load %	Power kW	FOC l/h	FUEL g/kWh	T inlet air °C	P ch air bar	T ch air °C (A/B bank)	T eng room °C	Rel. Hum. %	P ambient mbar	Scrub. Loop open/closed
		bef				#DIV/0!				~~[illegible]~~	~~95~~	~~1008.1~~	
07.06.17	1445	bef	30%	3.77MW	800	[illegible]	50	0.8	473/441	23°C	95%	1008.1	
07.06.17	1700	bef	50%	6.28MW	1400	[illegible]	57	2.0	508/467	23°C	94%	1009	
07.06.17	1815	bef	70%	8.50MW	1800	[illegible]	59	2.6	518/488	23°C	92%	1009	
07.06.17	1935	bef	82%	10.04MW	2050	[illegible]	62	3.0	540/517	23°C	89%	1010	
												~~1013~~	
08.06.17	2320	aft	30%	3.73	839	[illegible]	51	0.7	453/438	19.8	97%	1013	
09.06.17	0030	aft	50%	6.16	1318	[illegible]	57	2.0	500/463	19.9	98%	1013	
~~09.06.17~~	~~0145~~	~~aft~~	~~70%~~	~~8.78~~	~~1817~~	~~[illegible]~~	~~59~~	~~2.7~~	~~521/490~~	~~20.3~~	~~100%~~	~~1014~~	
09.06.17	2345	aft	70%	8.51	1719	[illegible]	59	2.7	513/477	20.8	97%	1017	
10.06.17	0030	aft	82%	10.17	2107	[illegible]	63	3.1	534/514	20.4	98%	1017	

Fuel density 0.96 Kg/l

12.06.17	0110		30%	3.91	871	223	49	0.8	465/428	21.3	94%	1008
10.06.17	0200		50%	6.01	1335	212	54	1.8	493/468	20.6	98%	1017
11.06.17	2315		70%	8.73	1824	209	60	2.7	526/488	22.9	92%	1009
11.06.17	2220		84%	10.44	2150	206	62	3.1	545/542	23.5	85%	1009

Appendix 10 (1/11)

WÄRTSILÄ	Wärtsilä Finland Oy, Technical Service HORIBA PG-350 Linearity check, calibration		
Team: EmisLab	Doc. No	Page	1 (1)
Type: Linearity Certificate	Doc. Version	Classification:	Internal/External

Analyser : *Horiba PG-350*
Serial number: *RER66L5E*

CO calibration gas: *Nominal 480 ppm CO*
CO measuring range: *0-500 ppm*

The calibration gases have been supplied by AGA Oy. The calibration gases has certificate.

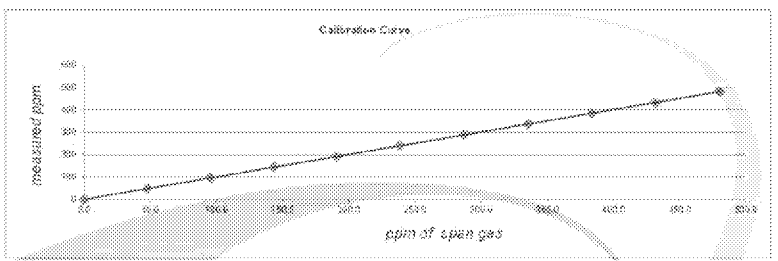
Date and place of test: *27.4.2017* *Calibration room, WFI-S, Runsor, Vaasa*

The zero and the span of the analyser were calibrated with the calibration gases via analyser calibration line. The linearity of the measurement channel was checked with a calibrated gas divider, made by Horiba. The results are presented in the table below.

The ambient conditions during the tests were as follows:

- Ambient temperature, °C: *22.9*
- Relative humidity, %: *25.6*
- Ambient pressure, mbar: *1007.1*

Gas mixture (%)	Gas divider (ppm)	Instrument reading (ppm)	Deviation (ppm)	Deviation of nominal value (%)	Deviation of full range (%)
0%	0.0	0	0.0	-	0.0%
10%	47.5	49	1.5	3.1%	0.3%
20%	95.5	97	1.7	1.8%	-
30%	143.5	146	2.5	1.7%	-
40%	190.6	193	2.4	1.3%	-
50%	238.6	241	2.4	1.0%	-
60%	286.8	289	2.2	0.8%	-
70%	335.3	337	1.7	0.5%	-
80%	383.5	385	1.5	0.4%	-
90%	431.5	433	1.5	0.3%	-
100%	480.0	480	0.0	0.0%	-



R^2=	1.0000
Y=	0.9995
Intercept	1.6939

The error is calculated as % of the nominal value of each calibration point, except for the zero point where the error is calculated as % of the measurement range. The maximum allowed deviation is ± 2 % from the nominal value at each calibration point and ± 1 % of the full scale at the zero point. For measurement points below 15 % of the measurement range the maximum allowed deviation is 2 % or 0.3% of measurement range.

The deviation of the measurement channel was thus found within the allowed limits throughout the whole measurement range.

Wärtsilä Finland Oy
Technical Service

Jukka Lankinen
Jukka Lankinen

Appendix 10 (2/11)

WÄRTSILÄ	Wärtsilä Finland Oy, Technical Service HORIBA PG-350 Linearity check, calibration		
Team: EmisLab	Doc. No:	Page:	1 (1)
Type: Linearity Certificate	Doc. Version:	Classification:	Internal/External

Analyser : *Horiba PG-350*
Serial number: *RER66L5E*

NO calibration gas: *Nominal 2360 ppm; Nominal 475 ppm (used for < 10% linearity points)*
NO measuring range: *0-2500 ppm*

The calibration gases have been supplied by AGA Oy. The calibration gases has certificate.

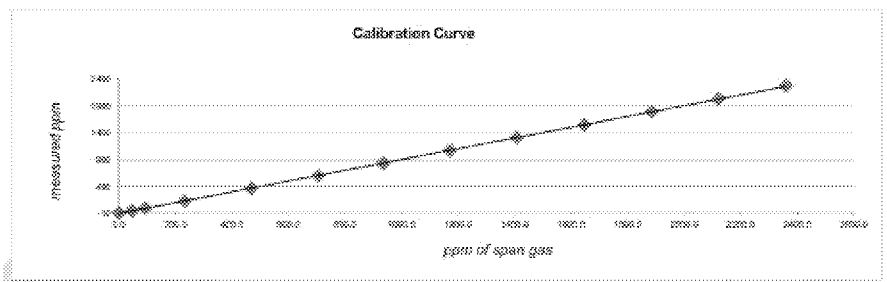
Date and place of test: *27.4.2017 Calibration room, WFI-S, Runsor, Vaasa*

The zero and the span of the analyser were calibrated with the calibration gases via analyser calibration line. The linearity of the measurement channel was checked with a calibrated gas divider, made by Horiba. The results are presented in the table below.

The ambient conditions during the tests were as follows:

- Ambient temperature, °C: *22.9*
- Relative humidity, %: *25.6*
- Ambient pressure, mbar: *1007.1*

Gas mixture (%)	Gas divider (ppm)	Instrument reading (ppm)	Deviation (ppm)	Deviation of nominal value (%)	Deviation of full range (%)
0%	0.0	1	1.0	-	0.0%
2%	47.0	45	-2.0	-0.1%	-0.1%
4%	95.0	92	-3.0	-0.1%	-0.1%
10%	234.0	229	-5.0	-2.1%	-0.2%
20%	470.0	463	-7.0	-1.5%	-
30%	706.0	698	-8.0	-1.1%	-
40%	937.0	927	-10.0	-1.1%	-
50%	1173.0	1163	-10.0	-0.9%	-
60%	1410.0	1402	-8.0	-0.6%	-
70%	1648.0	1641	-7.0	-0.4%	-
80%	1886.0	1880	-6.0	-0.3%	-
90%	2122.0	2121	-1.0	0.0%	-
100%	2360.0	2360	0.0	0.0%	-



R^2=	0.9999
Y=	0.9998
Intercept	-4.9057

The error is calculated as % of the nominal value of each calibration point, except for the zero point where the error is calculated as % of the measurement range. The maximum allowed deviation is ± 2 % from the nominal value at each calibration point and ± 1 % of the full scale at the zero point. For measurement points below 15 % of the measurement range the maximum allowed deviation is 2 % or 0.3% of measurement range.

The deviation of the measurement channel was thus found within the allowed limits throughout the whole measurement range.

Wärtsilä Finland Oy
Technical Service

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Appendix 10 (3/11)

WÄRTSILÄ	Wärtsilä Finland Oy, Technical Service HORIBA PG-350 Linearity check, calibration		
Team: EmisLab	Doc. No:	Page:	1 (1)
Type: Linearity Certificate	Doc. Version:	Classification:	Internal/External

Analyser : *Horiba PG-350*
Serial number: *RER56L5E*

O2 calibration gas: *Nominal 20,90 vol-% O2*
O2 measuring range: *0-25 vol-%*

The calibration gases have been supplied by AGA. The calibration gases has certificate.

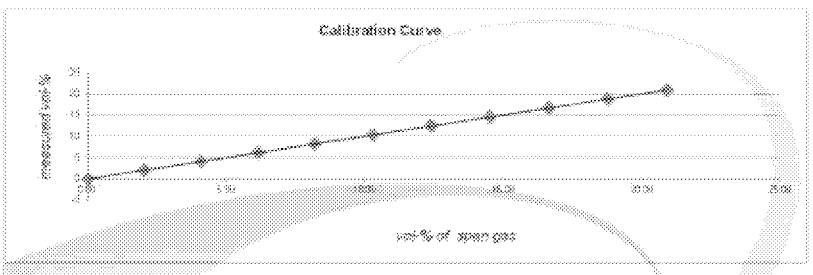
Date and place of test: 27.4.2017 *Calibration room, WFI-S, Runsor, Vaasa*

The zero and the span of the analyser were calibrated with the calibration gases via analyser calibration line. The linearity of the measurement channel was checked with a calibrated gas divider, made by Horiba. The results are presented in the table below.

The ambient conditions during the tests were as follows:

- Ambient temperature, °C: *22.9*
- Relative humidity, %: *25.6*
- Ambient pressure, mbar: *1007.1*

Gas mixture (%)	Gas divider (ppm)	Instrument reading (ppm)	Deviation (ppm)	Deviation of nominal value (%)	Deviation of full range (%)
0%	0.0	-0.04	-0.04	-	-0.2%
10%	2.0	2.02	-0.01	-0.5%	0.0%
20%	4.1	4.11	0.02	0.5%	-
30%	6.2	6.20	0.04	0.6%	-
40%	8.2	8.26	0.06	0.7%	-
50%	10.3	10.35	0.07	0.7%	-
60%	12.4	12.46	0.07	0.6%	-
70%	14.5	14.59	0.08	0.6%	-
80%	16.6	16.72	0.09	0.5%	-
90%	18.8	18.85	0.10	0.5%	-
100%	20.9	20.90	0.00	0.0%	-



R^2=	1.0000
Y=	1.0041
Intercept	0.0017

The error is calculated as % of the nominal value of each calibration point, except for the zero point where the error is calculated as % of the measurement range. The maximum allowed deviation is ± 2 % from the nominal value at each calibration point and ± 1 % of the full scale at the zero point. For measurement points below 15 % of the measurement range the maximum allowed deviation is 2 % or 0.3% of measurement range.

The deviation of the measurement channel was thus found within the allowed limits throughout the whole measurement range.

Wärtsilä Finland Oy
Technical Service

Jukka Lankinen
Jukka Lankinen

WÄRTSILÄ Technical Service				
	Title:	Crown Princess, W12V46 + Scrubber	Doc.ID:	DBAE542919
			Status:	Approved
			Checked:	TSu
	Subject:	Emissions measurement report	Pages:	37/46
	Author:	JCT	Created:	15.8.2017

Appendix 10 (4/11)

WÄRTSILÄ	Wärtsilä Finland Oy, Technical Service HORIBA PG-350 Linearity check, calibration		
Team: EmisLab	Doc. No:	Page:	1 (1)
Type: Linearity Certificate	Doc. Version:	Classification:	Internal/External

Analyser : *Horiba PG-350*
Serial number: *RER66L5E*

NO calibration gas: *Nominal 909 ppm SO2*
NO measuring range: *0-1000 ppm*

The calibration gases have been supplied by AGA Oy. The calibration gases has certificate.

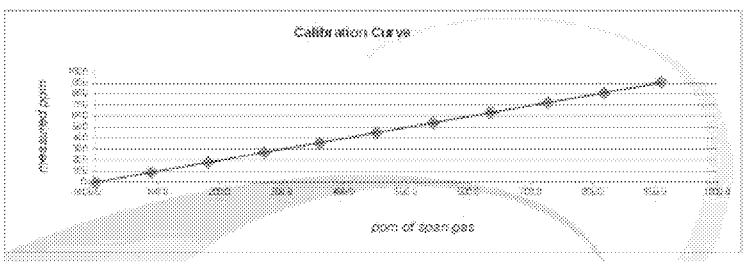
Date and place of test: *26.5.2017 Calibration room, WFI-S, Runsor, Vaasa*

The zero and the span of the analyser were calibrated with the calibration gases via analyser calibration line. The linearity of the measurement channel was checked with a calibrated gas divider, made by Horiba. The results are presented in the table below.

The ambient conditions during the tests were as follows:

- Ambient temperature, °C: *21,3*
- Relative humidity, %: *22,9*
- Ambient pressure, mbar: *1018,9*

Gas mixture (%)	Gas divider (ppm)	Instrument reading (ppm)	Deviation (ppm)	Deviation of nominal value (%)	Deviation of full range (%)
0%	0.0	0	0.0	-	0.0%
10%	90.0	87	-3.0	-3.3%	-0.2%
20%	181.0	178	-3.0	-1.7%	-
30%	272.0	268	-4.0	-1.5%	-
40%	361.0	356	-5.0	-1.4%	-
50%	452.0	447	-5.0	-1.1%	-
60%	543.0	538	-5.0	-0.9%	-
70%	635.0	630	-5.0	-0.8%	-
80%	726.0	721	-5.0	-0.7%	-
90%	817.0	813	-4.0	-0.5%	-
100%	909.0	906	-3.0	-0.3%	-



R^2=	0.9999
Y=	0.9973
intercept	-2.5969

The error is calculated as % of the nominal value of each calibration point, except for the zero point where the error is calculated as % of the measurement range. The maximum allowed deviation is ± 2 % from the nominal value at each calibration point and ± 1 % of the full scale of the zero point. For measurement points below 15 % of the measurement range the maximum allowed deviation is 2 % or 0.3% of measurement range.

The deviation of the measurement channel was thus found within the allowed limits throughout the whole measurement range.

Wärtsilä Finland Oy
Technical Service

Jukka Lankinen
Jukka Lankinen

Appendix 10 (5/11)

WÄRTSILÄ	Wärtsilä Finland Oy, Technical Service HORIBA PG-350 Linearity check, calibration		
Team: EmissLab		Doc. No:	Page: 1 (1)
Type: Linearity Certificate		Doc. Version:	Classification: Internal/External

Analyser : *Horiba PG-350*
Serial number: *RER66L5E*

CO2 calibration gas: *Nominal 9.53 ppm CO2*
CO2 measuring range: *0-10 ppm*

The calibration gases have been supplied by AGA Oy. The calibration gases has certificate.

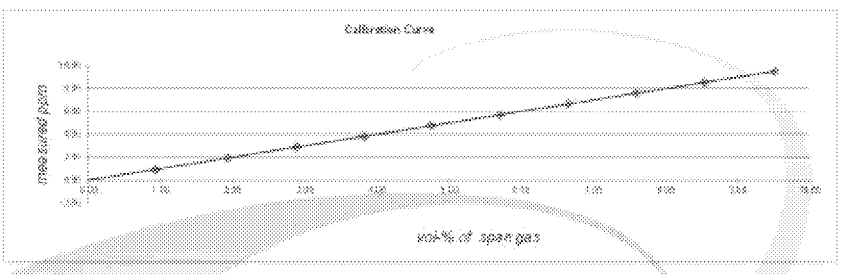
Date and place of test: 27.4.2017 *Calibration room, WFI-S, Runsor, Vaasa*

The zero and the span of the analyser were calibrated with the calibration gases via analyser calibration line. The linearity of the measurement channel was checked with a calibrated gas divider, made by Horiba. The results are presented in the table below.

The ambient conditions during the tests were as follows:

- Ambient temperature, °C: *22.9*
- Relative humidity, %: *25.6*
- Ambient pressure, mbar: *1007.1*

Gas mixture (%)	Gas divider (ppm)	Instrument reading (ppm)	Deviation (ppm)	Deviation of nominal value (%)	Deviation of full range (%)
0%	0.0	0.0	0.00	-	0.0%
10%	0.94	0.93	-0.01	-1.1%	-0.1%
20%	1.89	1.92	0.03	1.6%	-
30%	2.83	2.88	0.05	1.8%	-
40%	3.77	3.82	0.05	1.3%	-
50%	4.72	4.75	0.03	0.6%	-
60%	5.68	5.71	0.03	0.5%	-
70%	6.64	6.65	0.01	0.2%	-
80%	7.60	7.59	-0.01	-0.1%	-
90%	8.56	8.54	-0.02	-0.2%	-
100%	9.53	9.51	-0.02	-0.2%	-



R^2=	1.0000
Y=	0.9975
Intercept	0.0228

The error is calculated as % of the nominal value of each calibration point, except for the zero point where the error is calculated as % of the measurement range. The maximum allowed deviation is ± 2 % from the nominal value at each calibration point and ± 1 % of the full scale at the zero point. For measurement points below 15 % of the measurement range the maximum allowed deviation is 2 % or 0.3% of measurement range.

The deviation of the measurement channel was thus found within the allowed limits throughout the whole measurement range.

Wärtsilä Finland Oy
Technical Service

Jukka Lankinen
Jukka Lankinen

Appendix 10 (6/11)

WÄRTSILÄ	Wärtsilä Finland Oy, Technical Service Horiba PG-350, CO analyser, Water and CO2 interference tests.		
Made: Tom Sundell	Date: 1.2.2013	Page:	1 (1)
Approved:	Replaces:	Doc. No.:	DBAA778081

Analyzer: HORIBA PG-350
Serial number: RER66L5E

CO calibration gas for span calibration: 895 ppm CO,
CO measuring range: 0 – 1000 ppm

CO2 calibration gas for span calibration: 9,00 % CO2,
CO2 measuring range: 0 – 10 %

Date and place of test: 27.4.2017, Vaasa

The zero and the span of the analyser were calibrated with the calibration gases before the CO analyser interference check. The calibration gases have been supplied by AGA. The calibration gases have certificates.

The CO analyser interference was checked according to the procedures described for example in Appendix 4, Chapter 9.1 of the IMO NOx code.

A CO_2 calibration gas (=sample gas) with a 8,86 vol-% concentration was bubbled through water at room temperature (24 °C).

The sample gas was lead from the calibration gas bottle to the bubbling bottle and from there via a T-junction to the analyser and to an overflow flow meter.

The analyser zero reading for the CO channel was 1 ppm for the moisturised CO_2 gas with the zero point calibration gas (N2), corresponding to 0,1 % of the span.

The CO analyser thus fulfils the criteria of interference from CO_2 + H_20, which should be < 1 % of the measuring range for ranges greater than 300 ppm.

Wärtsilä Finland - Technical Service
Emission measurements

Jukka Lankinen
Jukka Lankinen

Appendix 10 (7/11)

WÄRTSILÄ	Wärtsilä Finland Oy, Technical Service Horiba PG-350, NOx analyser water quench test.		
Made: Tom Sundell	Date: 01.02.2013	Page: 1 (1)	
Approved:	Replaces:	Doc. No.: DBAA778085	

Analyzer: HORIBA PG-350
Serial number: RER66L5E

Date and place of test: 27.4.2017

The water quench check is applicable only for wet gas concentration measurements. The HORIBA PG-350 NOx analyser measures dry gases, i.e the water quench test is not applicable in this case.

Wärtsilä Finland - Technical Service
Emission measurements

Jukka Lankinen
Jukka Lankinen

Appendix 10 (8/11)

WÄRTSILÄ	Wärtsilä Finland Oy, Technical Service Horiba PG-350, NOx converter check.		
Team EmisLab	Doc. No	Page	1 (1)
Type converter check	Doc. Version	Classification:	Internal/External

Analyser : *Horiba PG-350*
Serial numbers: *RER66L5E*

Calibration gas for NOx converter checking	475	ppm NO
Calibration gas for span calibration	475	ppm NO
NO measuring range	0 - 500	ppm
Gas flow in analyzer	0.4	l/min

Date and place of test: *22.5.2017* *Calibration room, WFI-S, Runsor, Vaasa*

The zero and the span of the analyser was calibrated with the calibration gas (475 ppm NO) before the NOx converter efficiency check. The calibration gases have been supplied by AGA. The calibration gases have certificates.

The NOx converter efficiency was checked with the calibration gas method, which has been proved to give the same results as the official method in Appendix 4, Chapter 7 of the IMO NOx code. Only a very small over pressure was used in sample inlet line. An overflow line was connected to the inlet channel.

Measuring of the NO and NOx contents of the calibration gas

a =	*382*	A =	*454*
b =	*78*	B =	*456*
c =	*363*		
d =	*389*		
Efficinecy	**91.45**	**B/A =**	**1.00**

*EFF.= (1+(c-d)/(a-b))x100 (%)

NOx converter efficiency = *91.45* %

The NOx converter minimum required efficiency of 90 % was reached, OK !

Appendix 10 (9/11)

WÄRTSILÄ	Wärtsilä Finland Oy, Technical Service Horiba PG-350, NOx analyser CO_2 quench test		
Made: Jean-Christoffer Tuuf	Date: 1.2.2013	Page:	1 (1)
Approved:	Replaces:	Doc. No.:	DBAA778074

Analyzer: HORIBA PG-350
Serial number: RER66L5E

Gas divider: Horiba GDC-03

NO span gas for NOx analyzer: 2343 ppm NO,
NO measuring range: 0 – 2500 ppm

CO_2 span gas for CO_2 analyzer: 9,00 %,
CO_2 measuring range: 0 – 10 %

Date and place of test: 27.4.2017, Vaasa

The zero and the span of the analysers were calibrated with the calibration gases before the CO_2 quench check. The calibration gases have been supplied by Aga and have certificates.

The CO_2 quench was checked according to the procedures described for example in Appendix 4, Chapter 9.2 of the IMO NOx code.

A = 9.00 %, Undiluted CO_2 concentration with NDIR

The calibration gases were mixed via the Horiba GDC-03 gas divider:

- **CO_2 gas ⇒ Inlet 1**
- **NO gas ⇒ Inlet 2**
- **Mixed and unmixed gas ⇒ HORIBA and overflow**

Measuring of the gas mixture and NO gas:

B = 4,54 %, Diluted CO_2 concentration with NDIR
C = 1179 ppm, Diluted NO concentration with CLD
D = 2343 ppm, Undiluted NO concentration with CLD

Quench = (1-((C*A)/((D*A)-(D*B))))*100 % = ↔ -1,54 % of full scale.

The HORIBA PG-350 NOx analyzer thus fulfils the maximum allowed CO_2 quench of 3 % of full scale.

Wärtsilä Finland - Technical Service
Emission measurements

Jukka Lankinen
Jukka Lankinen

Appendix 10 (10/11)

Alicat Scientific, Inc.

7641 N. Business Park Dr., Tucson, AZ 85743 U.S.A.: 1.888.290.6060

Calibration Data Sheet

Certification Number: 162934

Customer:	Kubler Suomi Oy
Sales Order Number:	SO335344
Serial Number:	149680
Model Number:	MB-100SLPM-D
Software Version:	6v21.0-R22
Adder Codes:	5M, 3AS, Air
Process Gas:	Selectable
Calibration Gas:	Air
Range:	100.0 SLPM
Gas Temperature:	25.95°C
Ambient Humidity:	32.94%
Calibration Procedure/Rev. #:	DOC-AUTOCAL-GASFLOW,Rev. 92
Calibrated By:	Winston Allen
Calibration Date:	9/15/2017
Full Scale Pressure:	160.00 PSIA
Pressure Accuracy:	+/-0.5% of Full Scale
Temperature Accuracy:	+/-1.5°C
Standard Temp. & Pressure:	25.00°C, 14.69595 PSIA
Normal Temp. & Pressure:	0.00°C, 14.69595 PSIA
Calibration due 1 yr. after receipt:	

Equipment Used

Voltage:	TOOL-CMTR9	Temperature:	TOOL-TEMP18
Tool Due Date:	1/31/2018	Tool Due Date:	5/8/2017
Manufacturer/Model:	Fluke 95	Manufacturer/Model:	SELCO
Device Uncertainty:	+/- (0.1% + 1 digit)	Device Uncertainty:	+/- 0.75°C
Flow:	TOOL-FLOW43	Pressure:	TOOL-PRESSURE8
Tool Due Date:	7/11/2017	Tool Due Date:	3/9/2018
Manufacturer/Model:	Alicat / MCRM-120SLPM-D	Manufacturer/Model:	Alicat / P-100PSIG-D
Device Uncertainty:	+/- (0.3% Reading + 0.2% F.S.)	Device Uncertainty:	+/- 0.2% of full scale

All test equipment used for calibration is NIST traceable.

Calibration

Uncertainty: +/- (0.8% of Reading + 0.2% of Full Scale)

Units of measure: SLPM

Calibration Pressure: N/A

Output 1 Configuration
mini-DIN Pin #6

Output 2 Configuration
mini-DIN Pin #2

D.U.T.	Actual	In Tolerance	Output 1	Output 2
0.0	0.0	Yes	0.000 Vdc	5.12 Vdc
24.9	24.9	Yes	1.245 Vdc	5.12 Vdc
50.0	50.0	Yes	2.500 Vdc	5.12 Vdc
75.0	75.0	Yes	3.750 Vdc	5.12 Vdc
99.9	100.0	Yes	5.00 Vdc	5.12 Vdc

Tech Signature:

QC Signature:

Alicat Scientific, Inc. is an ISO 9001 certified company

CST Rev. 16 Last Modified 01/18/2013

Appendix 10 (11/11)

sartorius

Test report (for single-range | multi-interval weighing instruments)

Model	ME36S	Serial no.	25807084
Manufacturer	Sartorius	Inventory no.:	
Superrange-Micro balance with isoCal Delta T = 1.5 K or 4.0 h		Customer	Wärtsilä Tarhaajantie 2 FI65380 VAASA
Sensitivity drift between without function »isoCAL« 10°C ... 30°C (50°F ... 86°F) with function »isoCAL« 5°C ... 40°C (41°F ... 104°F)	±1 ppm/K	Place of installation	Emis lab
		Next test	

Range	I	II	III	IV	Unit
Max =	31000				g
d =	0.001				mg

Reason for completing the test report Service / maintenance	Ambient conditions Stable	Weight set No.: 26129876 Class: E2 / OIML R 111
	Air-cndit. + Stone slab	Valid until: 04.2018
Temperature during calibration: 23 °C	Acclimatisation time of the weights: 2 h	

The mass standards used in the measurements are subject to compliance with control of accuracy of inspection, measuring and test equipment, and meet the requirements of EN45501/OIML R76 item 3.7.1. They are traceable to a national standard..

Span			Adjust the span before every weighing!				Evaluation:
Perm. tolerance:	T	± 0.005 mg	Display (g)		Deviation Xi=Gi-W		
Test weight: Nom. val.:	P	30 g	G1	30.0000010	X1	-0.000009	X1 to X3 must be ≤ SU. ✓ X4 must be ≤ the perm. tolerance T. ✓
Deviation:	D	0.010 mg	G2	30.0000015	X2	-0.000008	
Uncertainty:	U	0.045 mg	G3	30.0000011	X3	-0.000009	
Conv. mass:	W	30.000010 g	$x_4 = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$		X4 = 0.0003 mg		
Sum: SU = T+U		0.05 mg					

Reproducibility:	
Perm. tolerance: „s"	≤ 0.002 mg
Test weight:	20 g
Zero before every measurement!	
Measurement	Display (g)
1	20.000001
2	19.999999
3	19.999999
4	19.999998
5	20.000003
6	20.000001
$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$	Standard deviation determined s = 0.0018 mg ☐

Off-center load:	
Perm. tolerance	± 0.010 mg
Test weight	20 g
Test weight on center and to be set to zero!	
Pos.	Display (g)
Center	0.0000012
Front/left	0.0000015
Behind/left	0.0000015
Behind/right	0.0000020
Front/right	0.0000015
The value obtained for every off-center loading position must be ≤ the permissible tolerance. Determined max. value = 0.000 mg ✓	

Linearity:								
Perm. tolerance:							± 0.010 mg	
Zero or tare before every measurement!								Evaluation:
Tare weight (g)		Test weight (g)		Display (g)		Deviation: Li=Gi-Pi		
		P	10	G1	10.000005	L1	0.000005	L = (Max Deviation – Min Deviation)/2 L = 0.0035 mg ≤ the perm. tolerance. ☐
T1	10	P	10	G2	10.000008	L2	0.000008	
T2	15	P	10	G3	10.000010	L3	0.000010	
T3	20	P	10	G4	10.000012	L4	0.000012	

Please not that we recommend a recalibration once a year.

☒ The deviations are within the perm. tolerances C	Date: 27 September 2016	
☐ The deviations are outside the perm. tolerances	Signature:	
Comments: Huoneessa ilmastointiyksikkö	Tommi Laine	

WÄRTSILÄ

Wärtsilä Finland Oy Technical Service

Exhaust gas particulate emission measurement (ISO 8178:1996)

General

Exhaust particulate emission measurement explained in this document, is in general ISO8178 method with small modifications for the easy manoeuvrability in limited space, e.g. onboard a ship. Additionally, some of the requirements fulfilled are according to 1996 version of the standard while in some cases, the requirements of the 2006 version of the standard are fulfilled. These deviations are explained in more detail in the next chapter. ISO8178 particulate measurement method utilizes exhaust gas dilution with dilution ratios higher than 4. After the dilution of the exhaust gas, the diluted sample gas is drawn through a filter. By measuring the mass gain of the filter (by weighting the filter before and after the filtration of exhaust) and calculating the volume of exhaust gas filtered, mass per volume unit result is obtained. This g/Nm³ or mg/Nm³ mass concentration result is the primary output of the measurement. Additional data is needed to calculate the specific emission (g/kWh or mg/kWh) of the engine.

Specific requirements of the ISO 8178 standard – 1996 or 2006 version of the standard

In cases where the 1996 and 2006 versions of the standard differ in some details, the 2006 version is preferred. A list below summarizes some of the differences of ISO8178 standard and specifies which version of the standard is followed and how this issue is coped.

- Filtration temperature: The temperature immediately upstream of the filter holder is below 52°C as required by the 1996version of the standard.
- Number of filters: Double filters are used as default. In the case that only single filter is used as defined by the 2006 version of the standard this is mentioned in the report. Pallflex TX-40 filters (Teflon coated glass fibre filters) have over 99% efficiency for 0.3µm particles even at lower flow speeds than required by 2006 version of the standard (http://www.pall.com/pdf/02.0601_Pallflex_LR.pdf)

Description of the measurement equipment

The measurement equipment is explained sequentially starting from the probe.

Probe: 6 mm outer diameter multi hole probe preferably placed in the middle of the duct

Transfer tube: Practically no transfer tube as the dilution tunnel is placed immediately after the probe, outside the duct.

Dilution tunnel: Dilution occurs immediately outside the exhaust duct. Dilution air flows in a 12mm outer diameter pipe and is introduced with the exhaust sample within a 8mm outer diameter dilution tunnel. Dilution tunnel is less than a meter long but due to the small diameter, the flow is highly turbulent ensuring good mixing.

Filter holder: Single stainless steel 47mm filter holder manufactured by PALL. Valves before and after the filter holder are used to cut off the flow during filter change.

Filtration temperature: Filtration temperature measured with a thermocouple and recorded automatically during the measurements.

Pressure drop over filter: Pressure drop over filter is measured with a differential pressure sensor and recorded automatically during the measurements

Dilution air cleaning: Dilution air flows through a carbon capsule and HEPA filter to remove hydrocarbon and particulate contamination from the dilution air.

Dilution flow controller: Dilution air flow is controlled by a mass flow controller via measurement software. The accuracy of the mass flow controller as given by the manufacturer is ± 0.7% of rate and ± 0.2% F.S. This results as accuracy better than 2% with dilution ratio of 4-5 and typical total flow used.

Total flow controller: Total flow is controlled by a mass flow controller via measurement software. The accuracy of the mass flow controller as given by the manufacturer is ± 0.7% of rate and ± 0.2% F.S. This results as accuracy better than 2% with dilution ratio of 4-5 and typical total flow used.

Software settings: Parameters for the sampling that are set up in the software are: sampling time, total flow and dilution ratio.

Data acquisition: National instruments data acquisition system is used to record the outputs of mass flow controllers (0-5V) for dilution and total flow.

Scale: Filters are weighed before and after the measurement with Sartorius ME36S having 2µg repeatability.

Parameters recorded

Software controlling the sampling records time, requested dilution and total flow together with the measurement output of the mass flow controllers for dilution and total flow with ~0.1s interval in an ASCII file. The filtration temperature and pressure drop over the filter are also recorded during the measurements.

Description of the measurement procedure

Filters that will be used in the measurement shall be weighed before they are used for sampling. Filters (primary and backup) will be set in their holders. Filter holders are connected to dilution tunnel and valves before and after the filter holders are opened. From the software, the desired dilution ration, total flow and measurement time are set. Unique measurement file names are set and measurement started. Software automatically draws exhaust gas sample according to pre-set parameters. After the sampling the valves are closed and filters are removed from filter holders and placed in plastic petri dishes. Measurement is done as multiple filter method – each filter is used only once.

Description of the calculation procedure

The recorded output of the mass flow controllers (0-5V) is converted to volume flow signal at reference temperature and pressure (25°C 100kPa). The amount of filtered exhaust is calculated by subtracting dilution flow from total flow. The mass gain of the filter is obtained by subtracting the filter mass before the exhaust sampling from the after sampling result. Mass gain of the filter is divided by the volume of exhaust sampled to get the mg/Nm^3 result.

In order to get the specific emission of the engine following data is also needed

- Absolute humidity of the engine intake air (g/kg)
- Specific exhaust mass flow (kg/kWh)

Flowcheck

A leak-check is performed before the measurement. Leak check is performed by plugging the probe and setting dilution air to zero and starting the measurement. A vacuum is drawn to the sampling system. The pump is closed and the pressure change is recorded in the system.

Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 8/4/2016 6:29:02 PM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: Greuel, Justin [Greuel.Justin@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]; Southampton, Client Management [southampton.client-management@lr.org]; Pritchard, Natasha [natasha.pritchard@lr.org]; Fasce, Matteo [Matteo.Fasce@lr.org]; Southampton [southampton@lr.org]
Subject: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Queen Mary 2, IMO 9241061
Attachments: MV Queen Mary 2 IMO 9241061-Letter of proposal-USCG.pdf; MV Queen Mary 2-IMO 9241061-EGCS Supporting Docs-USCG.pdf

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installed on M/V Queen Mary 2, IMO 9241061. Please could you acknowledge receipt of this notification.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST
Specialist, Engineering
Engineering Systems
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E darren.davies@lr.org

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Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.
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Working together for a safer world

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United States Coast Guard
USCG Headquarters
Washington, DC
US

Lloyd's Register North America Inc,
1715 114th Ave SE, Ste 120,
Bellevue,
WA98004, USA

CARNIVAL UK
Carnival House
100 Harbour Parade
Southampton
SO15 1ST

4TH August 2016

Re: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for M/V QUEEN MARY 2, IMO No. 9241061

Ref: USCG-CVC Policy Letter 12-04 of 25 July 2012

Dear CAPT Rand;

In accordance with the requirements of Article 5.b.ii. of the Reference the following documents are attached for USCG and US EPA review of the proposed approval of the Exhaust Gas Cleaning Systems to be issued on behalf of the Government of Bermuda:

- Copy of ship's IAPP, Article 2.6 endorsement.
- Completed Lloyd's Register Surveyors Checklist for "SOX Scrubber Scheme B".

Lloyd's Register surveyors have observed the safe operation of the EGCS system onboard M/V Queen Mary 2. We confirm that the Onboard Monitoring Manual (OMM), EGCS Technical Manual – Scheme B (ETMB), and Sulphur Emission Control Plan (SECP) have been reviewed, accepted and stamped by Lloyd's Register. We also confirm that these documents are physically held onboard the ship, and that the manuals have been verified to accurately represent the installed EGC Systems.

We kindly request your confirmation of this submission, which will complete the approval process and use of the system inside the North American Emission Control Area (ECA) during completion of any further USCG/EPA review.

Sincerely,

Lloyd's Register EMEA

Darren Davies
Lloyd's Register EMEA

Lloyd's Register

Carnival UK

ADRIAN N BOX
VICE PRESIDENT
TECHNICAL OPERATIONS
CARNIVAL UK.

Certificate no: **SOU 1600840**
Page 1 of 3

International Air Pollution Prevention Certificate

NOTE: This Certificate shall be supplemented by Record of Construction and Equipment No: **9241061/08**

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention") **under the authority of the Government of Bermuda** by Lloyd's Register EMEA.

	Particulars of Ship
Name of ship	**QUEEN MARY 2**
Distinctive number or letters	**ZCEF6**
Port of registry	**Hmilton**
Gross tonnage	**149,215**
IMO number	**9241061**

This is to certify:

1. that the ship has been surveyed in accordance with regulation 5 of Annex VI of the Convention; and

2. that the survey shows that the equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

Completion date of the survey on which this certificate is based: **07 December 2003**

This certificate is valid until **21 December 2018** subject to surveys in accordance with regulation 5 of Annex VI of the Convention.

Issued at **Southamoton** on **04 August 2016**

This certificate is issued by or on behalf of **Bermuda** under the responsibility of the United Kingdom as flag state under the Convention **This Certificate is issued by or on behlaf of Bermuda under the responsibility of the United Kingdom as flag state under the Convention.**

Lloyd's Register EMEA
Southampton Office

M. Fasce
Surveyor to Lloyd's Register EMEA

a member of the Lloyd's Register group.

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Form 2228REG (2015.06)

Endorsement for annual and intermediate surveys

This is to certify that at a survey required by regulation 5 of Annex VI of the Convention the ship was found to comply with the relevant provisions of that Annex:

Annual survey

Signed: Lloyd's Register EMEA Southampton Office

Place of survey **Southampton to Lanzarote**

Date **07 December 2014**

A.D. McGuire

Annual* survey

Signed: Lloyd's Register EMEA Southampton Office

Place of survey **Madeira to Southampton**

Date **15 December 2015**

A.D. McGuire

Intermediate* survey

Signed:

Place of survey

Date

Annual survey

Signed:

Place of survey

Date

Annual/Intermediate survey in accordance with regulation 9.8.3

This is to certify that, at an **Annual/Intermediate*** survey in accordance with regulation 9.8.3 of Annex VI of the Convention, the ship was found to comply with the relevant provisions of that Annex:

Signed:

Place of survey

Date

* *Delete as appropriate*

Endorsement to extend the certificate if valid for less than 5 years where regulation 9.3 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.3 of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement where the renewal survey has been completed and regulation 9.4 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.4 of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 9.5 or 9.6 applies

This certificate shall, in accordance with **regulation 9(5) or 9(6)*** of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement for advancement of anniversary date where regulation 9.8 applies

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: _____
Place of survey
Date

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: _____
Place of survey
Date

** Delete as appropriate*

Record of Construction and Equipment

Supplement to the International Air Pollution Prevention Certificate (IAPP Certificate)

Notes:

1 This Record shall be permanently attached to the IAPP Certificate. The IAPP Certificate shall be available on board the ship at all times.

2 The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.

3 Entries in boxes shall be made by inserting either a cross (X) for the answer "yes" and "applicable" or a (-) for the answers "no" and "not applicable" as appropriate.

4 Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and resolutions or circulars refer to those adopted by the International Maritime Organisation.

1. Particulars of Ship:

1.1	Name of ship	**QUEEN MARY 2**
1.2	IMO number	**9241061**
1.3	Date on which keel was laid or ship was at a similar stage of construction	**01 March 2002**
1.4	Length (L)[1] metres	**Not Applicable**

2. Control of emissions from ships

2.1 Ozone depleting substances (regulation 12)

2.1.1 The following fire extinguishing systems, other systems and equipment containing ozone-depleting substances, other than hydro-chlorofluorocarbons (HCFCs), installed before 19 May 2005 may continue in service:

System or equipment	Location on board	Substance

2.1.2 The following systems containing HCFCs installed before 1 January 2020 may continue in service:

System or equipment	Location on board	Substance

[1] *Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely for recreational purposes and to which, in accordance with regulation 13.5.2.1 or regulation 13.5.2.3, the NOx emission limit as given by regulation 13.5.1.1 will not apply.*

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2.2 Nitrogen oxides (NOx) (regulation 13):

2.2.1 The following marine diesel engines installed on this ship are in accordance with the requirements of regulation 13, as indicated:

Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)			Engine #1	Engine #2	Engine #3	Engine #4	Engine #5
1	Manufacturer and model		**WARTSILA W16V46C-CR**	**WARTSILA W16V46C-CR**	**WARTSILA W16V46C-CR**	**WARTSILA W16V46C-CR**	
2	Serial number		**91461**	**91462**	**91463**	**91464**	
3	Use (applicable application cycle(s) – NTC 3.2)		**E2**	**E2**	**E2**	**E2**	
4	Rated power (kW) (NTC 1.3.11)		**16800**	**16800**	**16800**	**16800**	
5	Rated speed (RPM) (NTC 1.3.12)		**514**	**514**	**514**	**514**	
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2		**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	
8b		13.2.1.2 & 13.2.3	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	
8c		13.2.1.3 & 13.2.3	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	
9a	Tier I	13.3	X	X	X	X	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)			Engine #6	Engine #7	Engine #8	Engine #9	Engine #10
1	Manufacturer and model						
2	Serial number						
3	Use (applicable application cycle(s) – NTC 3.2)						
4	Rated power (kW) (NTC 1.3.11)						
5	Rated speed (RPM) (NTC 1.3.12)						
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2						
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2					
8b		13.2.1.2 & 13.2.3					
8c		13.2.1.3 & 13.2.3					
9a	Tier I	13.3	--	--	--	--	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

	2.3	Sulphur oxides (SOx) and particulate matter (regulation 14)
	2.3.1	When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:
	2.3.1.1	fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
--		4.50% m/m (not applicable on or after 1 January 2012); or
X		3.50% m/m (not applicable on or after 1 January 2020); or
X		0.50% m/m, and/or
	2.3.1.2	an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:
--		4.50% m/m (not applicable on or after 1 January 2012); or
X		3.50% m/m (not applicable on or after 1 January 2020); or
X		0.50% m/m
	2.3.2	When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:
	2.3.2.1	fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
--		1.00% m/m (not applicable on or after 1 January 2015); or
X		0.10% m/m, and/or
	2.3.2.2	an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:
--		1.00% m/m (not applicable on or after 1 January 2015); or
X		0.10% m/m
	2.4	Volatile organic compounds (VOCs) (regulation 15)
--	2.4.1	The tanker has a vapour collection system installed and approved in accordance with MSC/Circ.585.

Approval certificate number	Approved operations manual	Approving authority	Date

--	2.4.2.1	For a tanker carrying crude oil, there is an approved VOC Management Plan
	2.4.2.2	VOC Management Plan approval reference:

Approval certificate number	Approved operations manual	Approving authority	Date

	2.5	Shipboard incineration (regulation 16)
		The ship has an incinerator:
	2.5.1	installed on or after 1 January 2000 that complies with:
X	2.5.1.1	resolution MEPC.76(40), as amended*

Manufacturer and model	Serial number	Type test certificate number
SCANSHIP ENGINEERING AS, SE 1400KW	**SE 137.02**	**DNV MED-B-965**
SCANSHIP ENGINEERING AS, SE 1400KW	**SE 138.02**	**DNV MED-B-965**

--	2.5.1.2	resolution MEPC.244(66)

Manufacturer and model	Serial number	Type test certificate number

* As amended by resolution MEPC.93(45).

2.5.2 installed before 1 January 2000 that complies with:

-- 2.5.2.1 resolution MEPC.59(33), amended**

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.2.2 resolution MEPC.76(40), amended*

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.3 installed before 1 January 2000 and which does not comply with resolution MEPC.76(40) as amended or resolution MEPC.59(33) as amended.

Manufacturer and model	Serial number	Type test certificate number

2.6 Equivalents (regulation 4)

The ship has been allowed to use the following fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to that required by this Annex:

System or equipment	Equivalent used	Approval reference	Method
Diesel Generator No. 1	**SOx Emis. reduction by EGCS**	**SOUTSO-WP26573207**	**Open loop EGC System**
Diesel Generator No. 2	**SOx Emis. reduction by EGCS**	**SOUTSO-WP26573207**	**Open loop EGC System**
Diesel Generator No. 3	**SOx Emis. reduction by EGCS**	**SOUTSO-WP26573207**	**Open loop EGC System**
Diesel Generator No. 4	**SOx Emis. reduction by EGCS**	**SOUTSO-WP26573207**	**Open loop EGC System**

This is to certify that this Record is correct in all respects.

Issued at **Southampton** on **04 August 2016**

Lloyd's Register EMEA
Southampton Office

M. Fasce
Surveyor to Lloyd's Register EMEA

a member of the Lloyd's Register group.

* As amended by resolution MEPC.93(45).
** As amended by resolution MEPC.92(45).

Form 2177 (2016.02)

IMO Number: 9241061

APPROVED

For and on behalf of the Government of the vessel's Registration, as shown in the attached Approval History, as complying with the Regulations stated below

EXHAUST GAS CLEANING (EGC) SYSTEM

The information contained in the SOx Emission Compliance Plan (SECP), Onboard Monitoring Manual (OMM) and EGC System Technical Manual "Scheme B" (ETM-B) have been examined for the compliance with Resolution MEPC. 259(68), Scheme 'B' (Continuous Monitoring with Parameter Checks), in accordance with Regulation 4.1 of the revised Marpol Annex VI, which allows the use of alternative compliance methods.

No alteration or revision shall be made to any part of this plan without the prior approval of the Lloyd's Register Group.

The Owner remains responsible for the accuracy of the information and details given in OMM, ETM-B and SECP.

29 Jul 2016
Nauman Siddiqui
Marine Technology and Engineering Services
Lloyd's Register EMEA

Signed: _____ Date: 29 July 2016

Surveyor to Lloyd's Register EMEA

A Member of The Lloyd's Register Group

Approval for compliance with Marpol Annex VI Regulation 4.1 and Resolution MEPC. 259(68), Scheme 'B' is subject to satisfactory onboard survey, which includes functional test and calibration of exhaust gas and wash water monitoring systems.

Lloyd's Register EMEA
Southampton Office

Signed _____ Date: 4 AUGUST 2016

Surveyor to Lloyd's Register .....EMEA.....

A Member of The Lloyd's Register Group

Approval is subject to verification that the arrangements onboard are identical to those described in SECP, OMM and ETM-B.

Lloyd's Register EMEA
Southampton Office

Signed _____ Date: 4 AUGUST 2016

Surveyor to Lloyd's Register .....EMEA.....

A Member of The Lloyd's Register Group

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IMO No. 9241061

APPROVAL HISTORY			
Original approval:			
NAME	PORT OF REGISTRY AND FLAG	OFFICIAL NO. OR CALL SIGN	SURVEYOR/DATE
"QUEEN MARY 2"	HAMILTON BERMUDA	ZCEF6	Nouman Ahmad Siddiqui 29 July 2016
Changes:			
"QUEEN MARY 2"	HAMILTON BERMUDA	ZCEF6	MARINE DAD SQUTSO-WP26573207 ISSUE No. 0 DATED 29 JULY 2016 Southampton Office 4 AUGUST 2016

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This is a copy of an electronic document. In the event of any conflict or ambiguity between the copy and the electronic document, which is retained and published by Lloyd's Register, the original electronic and certified version shall always prevail.

Exhaust Gas Cleaning System Initial Survey Checklist

Ships Name	IMO Number
QUEEN MARY 2	**9241061**
Port of Registry	
Hamilton	

Notes:-

1 Mark boxes 'Yes' for complied with 'No' for not complied with or 'NA' for not applicable
2 Part 1 AA, AB and BA are to be completed for ALL initial surveys
3 Part 2 complete the items for surveying the EGCS for compliance with LR Rule requirements (Pt. 5, Ch. 24)
4 Part 3 complete for surveying the EGCS for compliance with statutory requirements (IMO Res. MEPC.259(68))

Part 1 - General			
AA	**General**		
050	EGCS manufacturer	**Ecospray Technologies S.r.l.**	
100	EGCS Type/Model	**ECO-DeSOx**	
150	Serial Number(s)	**15-028-APC-SC-0100, 15-028-APC-SC-0200, 15-028-APC-SC-0300, 15-028-APC-SC-0400**	
200	EGCS exhaust gas flow capacity (m^3/hr)	**107,640**	
250	Engines connected to EGCS	**DG1, DG2, DG3 and DG4**	
250a	Engines max power rating (kW)	**16,800**	
300	Boilers connected to EGCS	**EGE1, EGE2, EGE3 and EGE4**	
300a	Boilers max maximum steaming rate	**15.6 bar**	
350	The scrubber has been approved in accordance with;		
350a	MEPC.259(68) Scheme A and SO_x emission compliance certificate sighted?		**No**
350b	MEPC.259(68) Scheme B?		**Yes**
AB	**National Administration Requirements**		
050	Have the country files been checked to ascertain any flag administration requirements?		**Yes**
100	Have all flag administration technical and reporting requirements been complied with?		**Yes**
BA	**Documentation – Design Approval**		
050	Design Appraisal Document issued and all comments closed out?		**Yes**
Part 2 - Survey of the EGCS			
CA	**Class Requirements Survey (Part 5, Chapter 24)**		
	Pumping and piping		
050	Was the system including associated pumps, process tanks, piping and fittings examined for obvious defects and found satisfactory?		**Yes**
100	Overboard discharge is below the water line of the ship when at its minimum operating draught?		**Yes**
150	Where plastic piping has been used with bonded pipes then the pipes are joined in accordance with a procedure approved by LR and evidence of the competency of person making such bonds is available for inspection?		**Yes**
200	Deck and bulkhead penetrations inspected for good workmanship and tightness?		**Yes**
250	For open loop EGCS, arrangements are in place to protect the system if the over board discharge valve is closed and there is valve position indication at the control station?		**Yes**
300	Pipes are adequately supported?		**Yes**
350	As far as practicable, was the operation of the system confirmed? NOTE: this does not require EGCS to operate at full load or with high sulphur fuel and may be demonstrated by running pumps and systems without exhaust gas flow?		**Yes**
400	Was the operation of the overflow protection arrangement confirmed by test or simulation including alarms and interlocks?		**Yes**
450	Does the EGCS serve more than one engine?		**No**
450a	If so, an isolation valve is fitted in the exhaust gas duct before the EGCS?		**NA**
500	Is the exhaust system fitted with a by-pass for the EGCS?		**No**
500a	If so, has the by-pass valve operation and valve position indication been confirmed?		**NA**
550	When the EGCS is running, are back pressure measurements for the exhaust system available?		**Yes**
550a	Is this back pressure within the maximum permitted levels for connected combustion machinery?		**Yes**
550b	Where fitted, induced draught fans are functional and in good condition?		**NA**

** Delete as appropriate*

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	Chemical substances and wash water	
600	Does the EGCS require any chemical substances for operation?	No
600a	Have chemical tanks, pumps and associated piping, fittings and transfer arrangements been examined for obvious defects and operation found satisfactory?	NA
600b	Where applicable chemical tank coatings have been inspected and found in good condition?	NA
600c	Where applicable, operation of quick closing valves on chemical tanks has been tested?	NA
600d	Where applicable, chemical tank heating and cooling has been demonstrated to be functioning?	NA
600e	Chemical and water process tank high and low level protection has been tested, as applicable?	NA
600f	Chemical tank spill containment arrangements are in place in accordance with applicable LR Rules and in good condition?	NA
600g	Arrangements are in place for draining, venting, purging and making safe chemical tanks so as to permit safe maintenance and inspection?	NA
600h	Suitable access arrangements are in place for the EGCS and any associated tanks?	NA
	Electrical and control equipment	
700	Protection device settings for all outgoing electrical circuits are as per approved plans?	Yes
700a	EGCS emergency stop demonstrated?	Yes
700b	EGCS alarms and audible and visual indicators have been tested as required by the surveyor?	Yes
Part 3	**Statutory Survey Requirements (IMO Res. MEPC.259(68))**	
DA	**Survey – Approved Documents**	
100	Have the following plans and documents been approved by or on behalf of the Flag State with approved copies being available on-board? NOTE: it is accepted that the approved copies may be in electronic format for completion of the survey	
100a	For European flag ships, a MED certificate for the EGCS has been issued has been issued?	NA
100b	The Sulphur Emissions Compliance Plan (SECP)?	Yes
100c	The On-board Monitoring Manual (OMM)?	Yes
100d	The Emissions Technical Manual Scheme A or Scheme B (ETM-A or ETM-B), as applicable?	Yes
100e	The Exhaust Gas Cleaning (EGC) Record book as described in the OMM? NOTE: where it is proposed to use the vessels planned maintenance system to demonstrate compliance with any requirements contained within the approved documents in this section then the format of the electronic records is to be approved.	Yes
100f	Sulphur Emissions Compliance Certificate (SECC),(Scheme A only)?	NA
100g	Any manuals, instruction books or other documents which are referenced in the SECP, OMM or ETM-A or ETM-B?	Yes
150	The vessel's International Air Pollution Prevention certification has been updated to reference the EGCS?	Yes
200	Has vessel's Flag Administration been notified of EGCS installation completion and update to IAPP?	Yes
DB	**Scheme A Only**	
050	The required sensors, for the continuous monitoring of the parameters listed in the ETM-A, are fitted?	NA
050a	Records and reports of parameters can be produced in accordance with the ETM-A?	NA
050b	Compliance checks carried out in accordance with the instructions contained in the ETM-A?	NA
050c	Any spot checks of emissions included in the ETM-A have been carried out, any required sensors and equipment are installed as stipulated in the ETM-A? NOTE: where a EGCS approved in accordance with Scheme A is fitted with continuous exhaust gas emissions monitoring equipment in order to comply with regional or national regulation (e.g. the European Sulphur Directive) then the arrangements are to be surveyed in accordance with DC.	NA
100	Checks have been carried out to confirm that the EGCS system is in accordance with the arrangements provided in the ETM-A?	NA
150	Verification of EGCS compliance completed in accordance with the instructions provided in the ETM-A?	NA
DC	**Scheme B Only**	
050	The exhaust gas monitoring system has been demonstrated as being in working condition? NOTE: the EGCS is not required to be fully operational to demonstrate that the monitoring system is in working condition. However if the monitoring system requires the EGCS to be in operation to allow verification then the EGCS will be required to be operational	Yes
050a	The zero and span checks were performed as per the OMM? NOTE: manufacturer's commissioning records and calibration certificates are to be used to demonstrate that the equipment has been correctly calibrated for the application.	Yes
050b	Any other operating checks required by the OMM to ensure the required operation of the monitoring system have been performed? NOTE: the system check (calibration/function check without gas) is to be demonstrated.	Yes
100	The required sensors, for the daily spot checks of the parameters listed in the OMM, are fitted?	Yes
150	The data recording components and arrangements for exhaust gas monitoring are as per the OMM?	Yes
150a	The exhaust gas data recording system can produce the reports specified in the OMM?	Yes
150b	Exhaust gas emissions reports inspected and demonstrate compliance with the applicable emission limits?	Yes

** Delete as appropriate*

DD	Scheme A & Scheme B	
050	The combustion devices to which the EGCS is fitted are in accordance with the description given in the ETM-A or ETM-B, as applicable?	Yes
100	The arrangement of the EGCS and any associated equipment are as given in the ETM-A or ETM-B, as applicable?	Yes
100a	The EGCS washwater monitoring system components and arrangement are as per the OMM, including those applicable to the washwater additives or other substances as identified in the ETM-A or ETM-B as applicable?	Yes
100b	The washwater rate is in accordance with the assumed values used in determining the: a. Polycyclic Aromatic Hydrocarbons (PAH) b. Nitrate limits applicable	Yes
100c	The washwater monitoring system was demonstrated in working conditions? NOTE – This may be demonstrated by running various pumps associated with the system and observing the measured readings	Yes
100d	The zero and span checks of the washwater pH, PAH and turbidity monitors were performed as per the OMM?	Yes
100e	In addition, any other operating checks required by the OMM to ensure the required operation were performed?	Yes
100f	The arrangements are in place for the sampling and analysis of washwater nitrate content? Washwater nitrate analysis available and EGC record book updated? NOTE: If nitrate analysis is not available at the time of survey, arrangements are to be made for confirmation at a later date.	Yes
100g	Discharged washwater plume pH measured externally from the ship (at rest in harbour), as applicable?	NA
100h	Wash water discharge pH has been verified by calculation or modelling as an alternative to physical measurement; details are included within the OMM?	Yes
200	The data recording components and arrangements for washwater are as per the OMM?	Yes
200a	The washwater data recording system can produce the reports specified in the OMM?	Yes
200b	Washwater reports inspected and demonstrate compliance with applicable emission limits?	Yes
300	The workmanship of the monitoring and recording system installation was satisfactory?	Yes
350	Was it confirmed that EGCS audible and visual alarms operate satisfactorily?	Yes
400	Was it confirmed that when applicable sufficient consumables for recording devices are onboard?	Yes
450	The procedures given in the SECP are incorporated in the ships operating procedures?	Yes
450a	Ship safety management system incorporates details of safe working procedures and equipment?	Yes

DE Remarks

DD100f: Arrangements for sampling and analysis of washwater nitrate confirmed that will be made at the next call in Southampton.

Surveyed By

Place of Survey **Southampton**

Date of Survey **04 August 2016**

Lloyd's Register EMEA
Southampton

M. Fasce
Surveyor to Lloyd's Register EMEA

a member of the Lloyd's Register group.

** Delete as appropriate*

Message

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 2/2/2017 3:57:44 AM
To: Samulski, Michael [samulski.michael@epa.gov]
CC: tdow@carnival.com; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]; Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Subject: EGCS EPA Dry Filter Brief for 02Feb17 v2.pptx
Attachments: EGCS EPA Dry Filter Brief for 02Feb17 v2.pptx

Dear Mike;
Here's the presentation for tomorrow.
Looking forward to speaking with you.
Best regards,
Mike

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 6/8/2016 8:40:31 PM
To: Marine-eca [Marine-eca@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Carnival Corporation - Reporting on Behalf of Princess Cruises - Caribbean Princess Final Report
Attachments: Caribbean Princess_Final Report_Bermuda_Confidential.pdf; Caribbean Princess_Final Report_Bermuda.pdf

To Whom It May Concern,
Hope this email finds you well.
Attached is the Final Report for the Caribbean Princess regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(c). We have provided two versions, one with the confidential business information included ("Caribbean Princess Final Report Bermuda Confidential") and the other with all confidential information redacted ("Caribbean Princess Final Report Bermuda").

Please let us know if we can provide you with any additional information.
Thank you for your continued support.
Sincerely,

Aubrie Brake
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Department of Maritime Administration, Government of Bermuda – Final Report

Carnival Corporation: One (1) Ship Operated by Princess Cruises
Caribbean Princess

Refs: MARPOL Annex VI, Regulation 3.2; Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(c)

1. The Company's experience:
General:
The Caribbean Princess is currently completing its in-service installations of two EGCSs. Once the installations are finalized and the EGCSs are Class approved, the two EGCSs can operate individually or simultaneously. During any run, with as many as two engines, the ship will be able to run its EGCSs to meet the Emission Control Area (ECA) requirement.

As with all Scheme B systems, the Caribbean Princess system will conduct continuous monitoring of SOx emissions with an installed gas analyzer by Consilium. The ship will also continuously monitor the quality of the EGCS washwater by analyzing data from pH, PAH, and Turbidity instruments. The data from these instruments will be recorded continuously (every 3 minutes) into a Compliance Computer. The recorded data will be matched with GMT time from the ship's master clock and ship's GPS coordinates to create an accurate record of both routine operations and special events, such as alarms.

Lloyd's Register is scheduled to review/approve the EGCSs on behalf of the Bermuda flag administration on 01 September 2016.

2. Information provided in Interim Reports:
Each quarterly Interim Report included fuel sulphur levels and calculations depicting the year-to-date average sulphur content and a summary of the sulphur levels for that quarter.

The average sulphur content for 2015:

Section C(5) Requirement	GULF	N. ATLANTIC	S. ATLANTIC
	2.9000%	2.5000%	2.8000%
Sum of % Sulphur	Column Labels		
Row Labels	Gulf	North Atlantic	South Atlantic
2015			
Caribbean	1.7747%	0.9016%	1.5463%

The average sulphur content for 2016:

Section C(5) Requirement	GULF
	2.9000%
Sum of % Sulphur	Column Labels
Row Labels	Gulf
2016	
Caribbean	2.0090%

3. Certification:
Based on information and belief formed after reasonable inquiry, the statements and information contained in this document are true, accurate, and complete.

Name: Capt. Emilio Tombolesi

Date: 8 June 2016

Title: Director Environmental Policy, Carnival Corporation

Signature:

Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 11/28/2016 8:58:31 AM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Koningsdam, IMO 9692557

Good Morning Capt. Rand,

With reference to your query of MV Koningsdam's EGCS capacity, the inserted image below shows the information you are seeking. If you prefer this to be presented in a different format, please let me know.

4 Operating Limits

The following table presents operating limits for the EGC System when the system is in the WET condition, there are no operating limits on the system when it is operating in the DRY condition.

		DGI2	DGI3
Operating limits, or range of operating values			
Max. Fuel oil sulphur content [% m/m]		**3.5**	**3.5**
Salinity levels		[nac]	[nac]
Wash-water additives		[nac]	[nac]
Minimum wash-water inlet alkalinity [μmol kg^{-1}]		**1300**	**1300**
Minimum dilution water inlet alkalinity [μmol kg^{-1}]		**1300**	**1300**
Exhaust gas mass flow rate [kg/h] (**Note:** Max. value corresponds to 85% MCR)	Min	[nac]	[nac]
	Max	75,510	75,510
Exhaust gas temperature at DeSOx Tower inlet [°C]	Min	[nac]	[nac]
	Max	380	380
Exhaust gas temperature at DeSOx Tower outlet [°C] (with the DeSOx Tower in operation)	Min	[nac]	[nac]
	Max	10°C above seawater temp.	
Exhaust gas pressure at DeSOx Tower inlet [hPa]	Min	[nac]	[nac]
	Max	50	50
Exhaust gas differential pressure across DeSOx Tower [hPa]	Min	[nac]	[nac]
	Max	**40**	**40**
Wash-water flow rate [m^3/h]	Min	**350**	**350**
	Max	**750**	**750**
Wash-water pressure at nozzles [barg]	Min	**0.3**	**0.3**
	Max	[nac]	[nac]

Table 3. Operating Limits **Note:** [nac] = not a constraint

Note: The parameters highlighted in **bold** in the table above are operating limits that are connected with the compliant operation of the EGC System, the other parameters are manufacturers' advised reasonable operating ranges.

Best Regards,

Darren Davies
Specialist, Engineering
Engineering Systems
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E darren.davies@lr.org

Lloyd's Register Marine & Offshore
Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.
Visit www.lr.org

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-----Original Message-----
From: Rand, Michael P CIV [mailto:Michael.P.Rand@uscg.mil]
Sent: 23 November 2016 12:06
To: Davies, Darren
Cc: samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Koningsdam, IMO 9692557

Dear Mr. Davies:

Thank you for submitting the documentation for the exhaust gas cleaning systems for the M/V KONINGSDAM.

Please provide the scrubber exhaust capacity in cubic meters/hour. I saw the footnote explaining that the value (kg/h) was from the engine tech manual, but I need it in cubic meters/hour.

I will contact you if I have additional questions.

Thank you.

r/Mike Rand

-----Original Message-----
From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Monday, November 21, 2016 5:51 AM
To: Rand, Michael P CIV
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE
Subject: [Non-DoD Source] USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Koningsdam, IMO 9692557

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installations on board M/V Koningsdam, IMO 9692557. Please could you acknowledge receipt of this notification.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems & MARPOL Department

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=Hmqz3yRqZ4KK9fND-JoYhXQA3q9N9jL7tkUBJwQhBHg&s=3jd3rZ4x4ghzeOTbU5jDtp0XD9Edcvv3D__HdcTomaw&e=>

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Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 1/14/2016 2:47:59 PM
To: Marine-eca [Marine-eca@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line, Carnival UK, Princess Cruises, and Holland America Line - January 2016 Interim Reports
Attachments: CUK Reporting 15 Days After Calendar Quarter January_15_2016.pdf; CCL Reporting 15 Days After Calendar Quarter January_15_2016_Bahamas.pdf; CCL Reporting 15 Days After Calendar Quarter January_15_2016_Panama.pdf; HAL Reporting 15 Days After Calendar Quarter January_15_2016_Netherlands.pdf; PCL Reporting 15 Days After Calendar Quarter January_15_2016.pdf

To Whom It May Concern,
Hope this email finds you well. Attached are the January 2016 Interim Reports regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(b).

Please let us know if we can provide you with any additional information.
Thank you for your continued support.
Sincerely,

Aubrie Brake
Manager – Environmental Policy | Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
Sent: 4/4/2017 12:26:01 PM
To: Davies, Darren [Darren.Davies@lr.org]
CC: Samulski, Michael [samulski.michael@epa.gov]; DeBord, Steven [DeBord.Steven@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Americas - NASE [americas.nase@lr.org]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Grand Princess, IMO 9104005

Dear Mr. Davies:

Thank you for submitting the documentation for the exhaust gas cleaning systems for the M/V GRAND PRINCESS.

I will contact you if I have questions.

r/Mike Rand

-----Original Message-----
From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Wednesday, March 29, 2017 9:01 AM
To: Rand, Michael P CIV
Cc: samulski.michael@epa.gov; debord.steven@epa.gov; Kaczmarek, Michael (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Americas - NASE; HQS-PF-fldr-ECA-Foreign
Subject: [Non-DoD Source] USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Grand Princess, IMO 9104005

Dear Capt. Rand,

Please find attached letter and supporting documentation for your notification of EGCS installations on board M/V Grand Princess, IMO 9104005. Please could you acknowledge receipt of this notification.

If you need any further information for your records, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems & MARPOL Department

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=DwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=UhZ4bdAVIB8m-asL8STg64kioxPJTXpJv0MR9_xsy2A&s=rE5TheXysUktHlgbd8dilujgbNJID1DO4Q_HrVxprO8&e=>

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Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 2/1/2017 10:42:18 PM
To: Marine-eca [Marine-eca@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; 2tomdow@gmail.com; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line, Princess Cruises, and Holland America Line - Final Reports
Attachments: removed.txt; removed.txt; removed.txt; removed.txt

To Whom It May Concern,
Hope this email finds you well. Attached are the Final Reports for the Carnival Magic, Carnival Valor, Coral Princess, and Oosterdam regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(c).

Two versions of each Final Report are attached in the zip files, one is confidential (the word "Confidential" is included in the document title) and the other has had all confidential information redacted. Also included are sample Compliance Computer reports.

Please let us know if we can provide you with any additional information.

Sincerely,
Aubrie Brake, Esq.
Manager – Corporate Environmental Compliance| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 7/19/2016 4:45:48 PM
To: Marine-eca [Marine-eca@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Continuous SOx Monitoring System Description Reports
Attachments: CCL Carnival Liberty_Continuous SOx Monitoring System_Panama.pdf; PCL Royal Princess_Continuous SOx Monitoring System_Bermuda.pdf

To Whom It May Concern,
Hope this email finds you well. Attached are the Continuous SOx Monitoring System Descriptions for the Carnival Liberty and the Royal Princess regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section C(7)(d).

Please let us know if we can provide you with any additional information.

Sincerely,
Aubrie Brake, Esq.
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Thomas Dow Ex. 6 Personal Privacy (PP)
Sent: 2/28/2017 3:36:34 PM
To: Samulski, Michael [samulski.michael@epa.gov]
CC: Michael Kaczmarek [MKaczmarek@carnival.com]; Laroo, Chris [laroo.chris@epa.gov]; THolm@carnival.com; Valerie Chatterley Ex. 6 Personal Privacy (PP)
Subject: Re: Carnival Ann Arbor visit

Mike,
I propose 9:00am - 1:00pm Tuesday. We would travel to Ann Arbor Monday evening.

I think we will overnight at the Sheraton and have a renal car, so please provide location and parking information.
Thanks and regards,

Tom Dow
Carnival Corporation

Sent from my iPad

> On Feb 28, 2017, at 5:28 AM, Samulski, Michael <samulski.michael@epa.gov> wrote:
>
> Tom,
>
> This day works for Chris and me. Will morning or afternoon work best for you? If you can propose a time, I will look for an available meeting room.
>
> Thanks,
>
> Mike
>
> **********
> Michael Samulski
> U.S. Environmental Protection Agency
> Office of Transportation and Air Quality
> Director, Large Marine and Aircraft Center
> 1 (734) 214-4532
> samulski.michael@epa.gov
> **********
>
> -----Original Message-----
> From: Thomas Dow Ex. 6 Personal Privacy (PP)
> Sent: Wednesday, February 22, 2017 1:22 PM
> To: Samulski, Michael <samulski.michael@epa.gov>
> Cc: Michael Kaczmarek <MKaczmarek@carnival.com>; Laroo, Chris <laroo.chris@epa.gov>
> Subject: Re: Carnival Ann Arbor visit
>
> Thanks, Mike.
> Let's pencil in Tuesday, 3/7. I'll confirm it works for our group and research travel options. We would try to accommodate Chris so we have the benefit of his expertise.
> Regards,
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> Tom
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> Sent from my iPad
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>> Tom,
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>> Monday morning 3/6 or Tuesday 3/7 will likely work. However, I won't know for sure until I can confirm with Chris Laroo, who is out of the office until February 28.
>>
>> Mike
>>
>>
>> **********
>> Michael Samulski
>> U.S. Environmental Protection Agency

>> Office of Transportation and Air Quality Director, Large Marine and
>> Aircraft Center
>> 1 (734) 214-4532
>> samulski.michael@epa.gov
>> ********
>>
>> -----Original Message-----
>> From: Thomas Dow Ex. 6 Personal Privacy (PP)
>> Sent: Wednesday, February 22, 2017 12:16 PM
>> To: Samulski, Michael <samulski.michael@epa.gov>
>> Cc: Michael Kaczmarek <MKaczmarek@carnival.com>
>> Subject: Carnival Ann Arbor visit
>>
>> Mike,
>> Following up on our last call, we appreciate your offer for a visit to your Ann Arbor office. Would you be available for a visit March 6th or 7th?
>>
>> The purpose would be to discuss exhaust testing methods for PM that are appropriate for Carnival's Exhaust GasCleaning Systems. We would hope that Chris Laroo would be available as well.
>>
>> If possible, a visit to EPA's testing/lab facility would be very helpful for us.
>>
>> We would have 3-4 people, and allow a half-day for the visit.
>> Thanks for the invitation and we hope the timing can work for you.
>> Regards,
>>
>> Tom Dow
>> Carnival Corporation.
>>
>> Sent from my iPad

Message

From: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
Sent: 4/4/2017 11:54:26 AM
To: Davies, Darren [Darren.Davies@lr.org]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]
CC: Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; MTES/MARPOL (Marpol) [marpol@lr.org]; Americas - NASE [americas.nase@lr.org]; DeBord, Steven [DeBord.Steven@epa.gov]
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Liberty, IMO 9278181

Dear Mr. Davies:

Thank you for submitting the documentation for the exhaust gas cleaning systems for the M/V CARNIVAL VALOR.

I will contact you if I have questions.

r/Mike Rand

-----Original Message-----
From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Thursday, March 23, 2017 9:10 AM
To: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Americas - NASE
Subject: [Non-DoD Source] USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Liberty, IMO 9278181

Dear Capt. Rand,

Please find attached letter and supporting documentation for your notification of EGCS installations on board M/V Carnival Liberty, IMO 9278181. Please could you acknowledge receipt of this notification.

If you need any further information for your records, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems & MARPOL Department

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=DwMFAg&c=0NKfg44GVknAU-

XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=IYaJN9tWWNryYoJHeUIB9Axptv_BcPu7dhP4EO8GO58&s=9lTy8LeyDkFX7-7yOE9xAjzVOUzdQ7tjX_h6kVD3X3Y&e=>

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Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 4/11/2016 5:40:17 PM
To: Samulski, Michael [samulski.michael@epa.gov]
Subject: Proposed Cruise Ship tour in Baltimore

Mike,
I hope you are doing well. We are working on a date for a briefing and shipboard tour of the Carnival Exhaust Gas Cleaning System in Baltimore. You can see below that May 8 works for Marcus Zobrist and his staff from EPA Water Division. Would you be able to join us?

Carnival Pride has six EGCS systems installed, one for every engine, the most in the fleet. The ship is in Baltimore on Sundays. The tour would be approximately 10-2. We would be pleased if Bill Charmley or others from your group could participate. Also, Chris Grundler or others from his Headquarters staff.

See below that Marcus Zobrist is available May 8th. Please advise if this could work for you. If not, we would work on a separate tour at another time.
Thanks and regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Monday, April 11, 2016 12:42 PM
To: Dow, Thomas (CarnCorp); Kaczmarek, Michael (CarnCorp)
Subject: Ship tour in Baltimore

Hi Tom.

Scheduling the ship tour in Baltimore, Sunday May 8th would work for Jack, Josh and I. While this tour would be fascinating and very informative for us at EPA, it is certainly not urgent. We could also look to dates in July or after as well. If there is a another date that works well with your schedules, and by that I mean not making a special trip, I would suggest we do that.

- Marcus

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 7/19/2016 2:34:32 PM
To: Samulski, Michael [samulski.michael@epa.gov]
Subject: Carnival up to date ECA Exemption list
Attachments: Milestone Dates_4.4.16.docx

Mike,
Thanks for taking time today to discuss our issues.
Attached is the most up to date list of ships with Exemptions. This arrived during our call.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

From: Brake, Aubrie (CarnCorp)
Sent: Tuesday, July 19, 2016 10:12 AM
To: Dow, Thomas (CarnCorp)
Subject: Most up to date ECA Exemption list

Good Morning Tom,
Just wanted to pass along a copy of the most up to date ECA Exemption list.
Hope you have a great day!

Sincerely,
Aubrie Brake, Esq.
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Exempt Install Year	Operating Company	Vessel Name	Initial Design	Ship Visit & Inspection	Design Finalization	Installation Period Begin	Installation Period End	Class Install Approval	EGCS Commissioning	Regulatory Approval	Exemption Expiration Date
2014	CCL	Carnival Pride	22-Apr-2014	17-May-2014	1-Jun-2014	19-Oct-2014	1-Apr-2015	1-Apr-2015	1-Jun-2015	1-Jun-2015	1-Jun-2015
2014	CCL	Carnival Paradise	30-Aug-2014	24-Sep-2014	9-Oct-2014	26-Feb-2015	12-Apr-2015	12-Apr-2015	11-Jun-2015	11-Jun-2015	11-Jun-2015
2015	CCL	Carnival Magic	12-Aug-2014	6-Sep-2014	21-Sep-2014	8-Feb-2015	24-Mar-2016	24-Mar-2016	24-May-2016	24-May-2016	24-May-2016
2015	CCL	Carnival Miracle	8-Sep-2014	3-Oct-2014	18-Oct-2014	7-Mar-2015	20-Apr-2015	20-Apr-2015	19-Jun-2015	19-Jun-2015	19-Jun-2015
2015	CCL	Carnival Victory	10-Nov-2014	5-Dec-2014	20-Dec-2014	9-May-2015	22-Jun-2015	22-Jun-2015	21-Aug-2015	21-Aug-2015	21-Aug-2015
2015	CCL	Carnival Dream	5-Mar-2015	30-Mar-2015	14-Apr-2015	1-Sep-2015	12-May-2016	12-May-2016	11-Jul-2016	11-Jul-2016	11-Jul-2016
2015	CCL	Carnival Breeze	19-Mar-2015	13-Apr-2015	28-Apr-2015	15-Sep-2015	17-Dec-2015	17-Dec-2015	15-Feb-2016	15-Feb-2016	15-Feb-2016
2015	CCL	Carnival Glory	4-Apr-2015	29-Apr-2015	14-May-2015	1-Oct-2015	2-Jan-2016	2-Jan-2016	2-Mar-2016	2-Mar-2016	2-Mar-2016
2015	CCL	Carnival Conquest	4-Jun-2015	29-Jun-2015	14-Jul-2015	1-Dec-2015	3-Mar-2016	3-Mar-2016	2-May-2016	2-May-2016	2-May-2016
2015	CCL	Carnival Valor	5-Jun-2015	30-Jun-2015	15-Jul-2015	2-Dec-2015	1-Apr-2016	1-Apr-2016	31-May-2016	31-May-2016	31-May-2016
2015	CCL	Carnival Sunshine	12-Jun-2015	7-Jul-2015	22-Jul-2015	9-Dec-2015	22-Feb-2016	22-Feb-2016	22-Apr-2016	22-Apr-2016	22-Apr-2016
2015	CCL	Carnival Triumph	12-Jun-2015	7-Jul-2015	22-Jul-2015	9-Dec-2015	22-Mar-2016	22-Mar-2016	21-May-2016	21-May-2016	21-May-2016
2016	CCL	Carnival Liberty	4-Oct-2015	29-Oct-2015	13-Nov-2015	1-Apr-2016	3-Jul-2016	3-Jul-2016	1-Sep-2016	1-Sep-2016	1-Sep-2016
2014	HAL	ms Volendam	11-Jun-2014	6-Jul-2014	21-Jul-2014	8-Dec-2014	20-Feb-2015	20-Feb-2015	21-Apr-2015	21-Apr-2015	21-Apr-2015
2015	HAL	ms Nieuw Amsterdam	30-Sep-2014	25-Oct-2014	9-Nov-2014	29-Mar-2015	7-Jun-2015	7-Jun-2015	6-Aug-2015	6-Aug-2015	6-Aug-2015
2015	HAL	ms Zuiderdam	1-Oct-2014	26-Oct-2014	10-Nov-2014	30-Mar-2015	12-Jun-2015	12-Jun-2015	11-Aug-2015	11-Aug-2015	11-Aug-2015
2015	HAL	ms Zaandam	21-Oct-2014	15-Nov-2014	30-Nov-2014	19-Apr-2015	28-Jun-2015	28-Jun-2015	27-Aug-2015	27-Aug-2015	27-Aug-2015
2015	HAL	ms Amsterdam	1-Nov-2014	26-Nov-2014	11-Dec-2014	30-Apr-2015	9-Jul-2015	9-Jul-2015	7-Sep-2015	7-Sep-2015	7-Sep-2015
2015	HAL	ms Noordam	19-Mar-2015	13-Apr-2015	28-Apr-2015	15-Sep-2015	12-Aug-2015	12-Aug-2015	11-Oct-2015	11-Oct-2015	11-Oct-2015
2015	PCL	Caribbean Princess	3-Jun-2015	28-Jun-2015	13-Jul-2015	30-Nov-2015	8-Feb-2016	8-Feb-2016	8-Apr-2016	8-Apr-2016	8-Apr-2016
2015	HAL	ms Eurodam	4-Jun-2015	29-Jun-2015	14-Jul-2015	1-Dec-2015	9-Feb-2016	9-Feb-2016	9-Apr-2016	9-Apr-2016	9-Apr-2016
2016	HAL	ms Oosterdam	2-Oct-2015	27-Oct-2015	11-Nov-2015	30-Mar-2016	12-Jun-2016	12-Jun-2016	11-Aug-2016	11-Aug-2016	11-Aug-2016
2014	PCL	Star Princess	12-Jun-2014	7-Jul-2014	22-Jul-2014	9-Dec-2014	17-Feb-2015	17-Feb-2015	18-Apr-2015	18-Apr-2015	18-Apr-2015
2015	PCL	Crown Princess	3-Nov-2014	28-Nov-2014	13-Dec-2014	2-May-2015	13-Jul-2015	13-Jul-2015	11-Sep-2015	11-Sep-2015	11-Sep-2015
2016	PCL	Ruby Princess	6-Jul-2015	31-Jul-2015	15-Aug-2015	2-Jan-2016	2-Mar-2016	2-Mar-2016	1-May-2016	1-May-2016	1-May-2016
2015	PCL	Emerald Princess	5-Jun-2015	30-Jun-2015	15-Jul-2015	2-Dec-2015	10-Feb-2016	10-Feb-2016	10-Apr-2016	10-Apr-2016	10-Apr-2016
2015	PCL	Royal Princess	9-Jun-2015	4-Jul-2015	19-Jul-2015	6-Dec-2015	18-Mar-2016	18-Mar-2016	17-May-2016	17-May-2016	17-May-2016
2016	PCL	Coral Princess	9-Oct-2015	3-Nov-2015	18-Nov-2015	7-Apr-2016	7-May-2016	7-May-2016	6-Jul-2016	6-Jul-2016	6-Jul-2016
2015	PCL	Golden Princess	18-Oct-2014	12-Nov-2014	27-Nov-2014	16-Apr-2015	1-Jul-2015	1-Jul-2015	30-Aug-2015	30-Aug-2015	30-Aug-2015
2015	CUK	Queen Mary 2	9-May-2015	3-Jun-2015	18-Jun-2015	5-Nov-2015	8-May-2016	8-May-2016	7-Jul-2016	7-Jul-2016	7-Jul-2016

Message

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 2/28/2017 1:33:12 PM
To: Samulski, Michael [samulski.michael@epa.gov]
Subject: RE: Carnival Ann Arbor visit

Great!

-----Original Message-----
From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Tuesday, February 28, 2017 8:30 AM
To: Thomas Dow
Cc: Kaczmarek, Michael (CarnCorp); Laroo, Chris
Subject: RE: Carnival Ann Arbor visit

Tom,

This day works for Chris and me. Will morning or afternoon work best for you? If you can propose a time, I will look for an available meeting room.

Thanks,

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

-----Original Message-----
From: Thomas Dow Ex. 6 Personal Privacy (PP)
Sent: Wednesday, February 22, 2017 1:22 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Cc: Michael Kaczmarek <MKaczmarek@carnival.com>; Laroo, Chris <laroo.chris@epa.gov>
Subject: Re: Carnival Ann Arbor visit

Thanks, Mike.
Let's pencil in Tuesday, 3/7. I'll confirm it works for our group and research travel options. We would try to accommodate Chris so we have the benefit of his expertise.
Regards,

Tom

Sent from my iPad

> On Feb 22, 2017, at 9:48 AM, Samulski, Michael <samulski.michael@epa.gov> wrote:
>
> Tom,
>
> Monday morning 3/6 or Tuesday 3/7 will likely work. However, I won't know for sure until I can confirm with Chris Laroo, who is out of the office until February 28.
>
> Mike
>
>
> **********
> Michael Samulski
> U.S. Environmental Protection Agency
> Office of Transportation and Air Quality Director, Large Marine and
> Aircraft Center
> 1 (734) 214-4532
> samulski.michael@epa.gov
> **********
>
> -----Original Message-----
> From: Thomas Dow Ex. 6 Personal Privacy (PP)
> Sent: Wednesday, February 22, 2017 12:16 PM

> To: Samulski, Michael <samulski.michael@epa.gov>
> Cc: Michael Kaczmarek <MKaczmarek@carnival.com>
> Subject: Carnival Ann Arbor visit
>
> Mike,
> Following up on our last call, we appreciate your offer for a visit to your Ann Arbor office. Would you be available for a visit March 6th or 7th?
>
> The purpose would be to discuss exhaust testing methods for PM that are appropriate for Carnival's Exhaust GasCleaning Systems. We would hope that Chris Laroo would be available as well.
>
> If possible, a visit to EPA's testing/lab facility would be very helpful for us.
>
> We would have 3-4 people, and allow a half-day for the visit.
> Thanks for the invitation and we hope the timing can work for you.
> Regards,
>
> Tom Dow
> Carnival Corporation.
>
> Sent from my iPad

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 7/19/2016 2:05:24 PM
To: Samulski, Michael [samulski.michael@epa.gov]
Subject: RE: Available for a call

Mike,
I'll call now. Thanks.
Tom

From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Tuesday, July 19, 2016 10:04 AM
To: Dow, Thomas (CarnCorp)
Subject: RE: Available for a call

Tom,

I'm available for a call anytime between now and 2:00 (Eastern). Let me know if that works for you.

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Monday, July 18, 2016 2:07 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Subject: Available for a call

Mike,
Hope you are doing well.
Are you available for 10-15 minutes for a call today? Two items for discussion:

1. A final adjustment of one ship Exemption date.
2. Upcoming briefing and ship tour in Baltimore July 24th.

Thanks,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 1/30/2017 4:00:51 PM
To: Samulski, Michael [samulski.michael@epa.gov]
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Bondi, Tandy (CarnCorp) [TBondi@carnival.com]
Subject: Re: Carnival Call-Update on EGCS Project

Mike
We can move to 2pm Thursday.

Mike Kaczmarek will send invite with dial-in.
Regards,

Tom Dow

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Monday, January 30, 2017 10:48 AM
To: Dow, Thomas (CarnCorp)
Cc: Kaczmarek, Michael (CarnCorp); Bondi, Tandy (CarnCorp)
Subject: RE: Carnival Call-Update on EGCS Project

Tom,

Would it be possible to move this back 1/2 hour to 2:00pm? I now have a conflict from 1:00-2:00 on Thursday that I can't move.

Thanks,

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, January 25, 2017 4:43 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Cc: Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>; Bondi, Tandy (CarnCorp) <TBondi@carnival.com>
Subject: Carnival Call-Update on EGCS Project

Mike,
We propose next Thursday, Feb. 2nd at 1.30pm EST. Allow 60 minutes.

Please advise if this works for you and if you want to add anyone from your group. Mike Kaczmarek will send an invite and dial-in number.
Thanks,

Tom Dow
Carnival Corporation

Sent from Tom Dow's Blackberry

Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 3/29/2017 12:55:18 PM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: Samulski, Michael [samulski.michael@epa.gov]; DeBord, Steven [DeBord.Steven@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Americas - NASE [americas.nase@lr.org]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]
Subject: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Grand Princess, IMO 9104005
Attachments: MV Grand Princess-EGCS Notification Letter-USCG.pdf; MV Grand Princess IMO 9104005-EGCS Supporting Info-USCG.pdf; MV Grand Princess-EGCS Serial Numbers-USCG.pdf

Dear Capt. Rand,

Please find attached letter and supporting documentation for your notification of EGCS installations on board *M/V Grand Princess, IMO 9104005*. Please could you acknowledge receipt of this notification.

If you need any further information for your records, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST
Specialist, Engineering
Engineering Systems & MARPOL Department
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E darren.davies@lr.org

Lloyd's Register Marine & Offshore
Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.
Visit www.lr.org

Working together for a safer world

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International Air Pollution Prevention Certificate

NOTE: This Certificate shall be supplemented by Record of Construction and Equipment No: **9104005/09**

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention") **under the authority of the Government of Bermuda** by Lloyd's Register North America, Inc..

	Particulars of Ship
Name of ship	**GRAND PRINCESS**
Distinctive number or letters	**ZCBU5**
Port of registry	**HAMILTON**
Gross tonnage	**107,517**
IMO number	**9104005**

This is to certify:

1. that the ship has been surveyed in accordance with regulation 5 of Annex VI of the Convention; and

2. that the survey shows that the equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

Completion date of the survey on which this certificate is based: **20 May 2013**

This certificate is valid until **31 May 2018** subject to surveys in accordance with regulation 5 of Annex VI of the Convention.

Issued at **Los Angeles** on **27 March 2017**

This certificate is issued by or on behalf of **Bermuda** under the responsibility of the United Kingdom as flag state under the Convention

Lloyd's Register North America, Inc. Houston, TX Los Angeles Office

Wietze Gjalterna
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

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Endorsement for annual and intermediate surveys

This is to certify that at a survey required by regulation 5 of Annex VI of the Convention the ship was found to comply with the relevant provisions of that Annex:

Annual survey

Signed:
Place of survey **Seattle, WA**
Date **18 May 2014**

for **Ken Walker**

Intermediate* survey

Signed:
Place of survey **Whittier, AK to Vancouver, BC**
Date **23 May 2015**

for **S-J.Bailey**

Annual* survey

Signed:
Place of survey **At Sea, Long Beach to San Francisco**
Date **01 May 2016**

for **Raj Bajpai**

Annual survey

Signed:
Place of survey
Date

Annual/Intermediate survey in accordance with regulation 9.8.3

This is to certify that, at an **Annual/Intermediate*** survey in accordance with regulation 9.8.3 of Annex VI of the Convention, the ship was found to comply with the relevant provisions of that Annex:

Signed:
Place of survey
Date

* *Delete as appropriate*

Form 2228REG (2015.06)

Endorsement to extend the certificate if valid for less than 5 years where regulation 9.3 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.3 of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement where the renewal survey has been completed and regulation 9.4 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.4 of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 9.5 or 9.6 applies

This certificate shall, in accordance with **regulation 9(5) or 9(6)*** of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement for advancement of anniversary date where regulation 9.8 applies

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: _____
Place of survey
Date

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: _____
Place of survey
Date

** Delete as appropriate*

Form 2228REG (2015.06)

Record of Construction and Equipment

Supplement to the Statement of Compliance

Notes:

1 This Record shall be permanently attached to the IAPP Certificate. The IAPP Certificate shall be available on board the ship at all times.

2 The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.

3 Entries in boxes shall be made by inserting either a cross (X) for the answer "yes" and "applicable" or a (-) for the answers "no" and "not applicable" as appropriate.

4 Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and resolutions or circulars refer to those adopted by the International Maritime Organisation.

1. Particulars of Ship:

1.1	Name of ship	**GRAND PRINCESS**
1.2	IMO number	**9104005**
1.3	Date on which keel was laid or ship was at a similar stage of construction	**18 July 1996**
1.4	Length (L)[1] metres	**Not applicable**

2. Control of emissions from ships

2.1 Ozone depleting substances (regulation 12)

2.1.1 The following fire extinguishing systems, other systems and equipment containing ozone-depleting substances, other than hydro-chlorofluorocarbons (HCFCs), installed before 19 May 2005 may continue in service:

System or equipment	Location on board	Substance

2.1.2 The following systems containing HCFCs installed before 1 January 2020 may continue in service:

System or equipment	Location on board	Substance
A/C Compressor 5	**A/C Compressor Room Deck 1**	**R22**

[1] *Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely for recreational purposes and to which, in accordance with regulation 13.5.2.1 or regulation 13.5.2.3, the NOx emission limit as given by regulation 13.5.1.1 will not apply.*

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2.2 Nitrogen oxides (NOx) (regulation 13):

2.2.1 The following marine diesel engines installed on this ship are in accordance with the requirements of regulation 13, as indicated:

	Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)		Engine #1	Engine #2	Engine #3	Engine #4	Engine #5
1	Manufacturer and model		**Sulzer 16 ZA40S**	**Sulzer 16 ZA40S**	**Sulzer 16 ZA40S**	**Sulzer 16 ZA40S**	**Sulzer 16 ZA40S**
2	Serial number		**2037**	**2038**	**2039**	**2040**	**2041**
3	Use (applicable application cycle(s) – NTC 3.2)		**D2**	**D2**	**D2**	**D2**	**D2**
4	Rated power (kW) (NTC 1.3.11)		**11520**	**11520**	**11520**	**11520**	**11520**
5	Rated speed (RPM) (NTC 1.3.12)		**514**	**514**	**514**	**514**	**514**
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		–	–	–	–	–
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2		**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
8b		13.2.1.2 & 13.2.3	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
8c		13.2.1.3 & 13.2.3	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
9a	Tier I	13.3	–	–	–	–	–
9b		13.2.2	–	–	–	–	–
9c		13.2.3.1	–	–	–	–	–
9d		13.2.3.2	–	–	–	–	–
9e		13.7.1.2	–	–	–	–	–
10a	Tier II	13.4	–	–	–	–	–
10b		13.2.2	–	–	–	–	–
10c		13.2.2 (Tier III not possible)	–	–	–	–	–
10d		13.2.3.2	–	–	–	–	–
10e		13.5.2 (Exemptions)	–	–	–	–	–
10f		13.7.1.2	–	–	–	–	–
11a	Tier III (ECA-NOx only)	13.5.1.1	–	–	–	–	–
11b		13.2.2	–	–	–	–	–
11c		13.2.3.2	–	–	–	–	–
11d		13.7.1.2	–	–	–	–	–
12	AM*	installed	–	–	–	–	–
13		not commercially available at this survey	–	–	–	–	–
14		not applicable	–	–	–	–	–

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

	Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)		Engine #6	Engine #7	Engine #8	Engine #9	Engine #10
1	Manufacturer and model		**Sulzer 16 ZA40S**				
2	Serial number		**2042**				
3	Use (applicable application cycle(s) – NTC 3.2)		**D2**				
4	Rated power (kW) (NTC 1.3.11)		**11520**				
5	Rated speed (RPM) (NTC 1.3.12)		**514**				
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2		**Not Applicable**				
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	**Not Applicable**				
8b		13.2.1.2 & 13.2.3	**Not Applicable**				
8c		13.2.1.3 & 13.2.3	**Not Applicable**				
9a	Tier I	13.3	--	--	--	--	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

2.3 Sulphur oxides (SOx) and particulate matter (regulation 14)

2.3.1 When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:

2.3.1.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

-- 4.50% m/m (not applicable on or after 1 January 2012); or

X 3.50% m/m (not applicable on or after 1 January 2020); or

X 0.50% m/m, and/or

2.3.1.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:

-- 4.50% m/m (not applicable on or after 1 January 2012); or

X 3.50% m/m (not applicable on or after 1 January 2020); or

X 0.50% m/m

2.3.2 When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:

2.3.2.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

-- 1.00% m/m (not applicable on or after 1 January 2015); or

X 0.10% m/m, and/or

2.3.2.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:

-- 1.00% m/m (not applicable on or after 1 January 2015); or

X 0.10% m/m

2.4 Volatile organic compounds (VOCs) (regulation 15)

-- 2.4.1 The tanker has a vapour collection system installed and approved in accordance with MSC/Circ.585.

Approval certificate number	Approved operations manual	Approving authority	Date

-- 2.4.2.1 For a tanker carrying crude oil, there is an approved VOC Management Plan

2.4.2.2 VOC Management Plan approval reference:

Approval certificate number	Approved operations manual	Approving authority	Date

2.5 Shipboard incineration (regulation 16)

The ship has an incinerator:

2.5.1 installed on or after 1 January 2000 that complies with:

-- 2.5.1.1 resolution MEPC.76(40), as amended*

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.1.2 resolution MEPC.244(66)

Manufacturer and model	Serial number	Type test certificate number

* As amended by resolution MEPC.93(45).

2.5.2 installed before 1 January 2000 that complies with:

-- 2.5.2.1 resolution MEPC.59(33), amended**

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.2.2 resolution MEPC.76(40), amended*

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.3 installed before 1 January 2000 and which does not comply with resolution MEPC.76(40) as amended or resolution MEPC.59(33) as amended.

Manufacturer and model	Serial number	Type test certificate number
DEERBERG W 1600H	**11/1401 B**	**N/A**

2.6 Equivalents (regulation 4)

The ship has been allowed to use the following fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to that required by this Annex:

System or equipment	Equivalent used	Approval reference	Method
No. 1 Diesel Engine EGC System	**Exhaust Gas Cleaning System.. MEPC-184(59) Scheme B**	**LR MTES-WP20021551 Issue 0**	**IMO Res. MEPC. 184(59) Scheme B**
No. 2, 5 & 6 DG EGC System	**Exhaust Gas Cleaning System MEPC-184(59) Scheme B**	**SOUTSO/MPL/28632772**	**IMO Res. MEPC. 184(59) Scheme B**

This is to certify that this Record is correct in all respects.

Issued at **Los Angeles** on **27 March 2017**

Lloyd's Register North America, Inc. Regional Office

Wietze Gjaltema
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

* As amended by resolution MEPC.93(45).
** As amended by resolution MEPC.92(45).

Form 2177 (2016.02)

IMO Number: 9104005

APPROVED

For and on behalf of the Government of the vessel's Registration, as shown in the attached Approval History, as complying with the Regulations stated below

EXHAUST GAS CLEANING (EGC) SYSTEM

The information contained in the SOx Emission Compliance Plan (SECP), Onboard Monitoring Manual (OMM) and EGC System Technical Manual "Scheme B" (ETM-B) have been examined for the compliance with Resolution MEPC.184 (59), Scheme 'B' (Continuous Monitoring with Parameter Checks), in accordance with Regulation 4.1 of the revised Marpol Annex VI, which allows the use of alternative compliance methods.

No alteration or revision shall be made to any part of this plan without the prior approval of the Lloyd's Register Group.

The Owner remains responsible for the accuracy of the information and details given in OMM, ETM-B and SECP.

Signed _____ Date: 01 December 2014

Surveyor to Lloyd's Register EMEA

A Member of The Lloyd's Register Group

Approval for compliance with Marpol Annex VI Regulation 4.1 and Resolution MEPC.184 (59), Scheme 'B' is subject to satisfactory onboard survey, which includes functional test and calibration of exhaust gas and wash water monitoring systems.

Lloyd's Register North America, Inc. Initials: WO Los Angeles Office

Signed _____ Date: 27 March 2017

Surveyor to Lloyd's Register North America Inc.

A Member of The Lloyd's Register Group

Approval is subject to verification that the arrangements onboard are identical to those described in SECP, OMM and ETM-B.

Lloyd's Register North America, Inc. Initials: WO Los Angeles Office

Signed _____ Date: 27 March 2017

Surveyor to Lloyd's Register North America Inc.

A Member of The Lloyd's Register Group

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IMO No. 9104005

APPROVAL HISTORY			
Original approval:			
NAME	PORT OF REGISTRY AND FLAG	OFFICIAL NO. OR CALL SIGN	SURVEYOR/DATE
"GRAND PRINCESS"	HAMILTON BERMUDA	ZCBU5	Nouman Ahmad Siddiqui 01 December 2014
Changes:			

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Exhaust Gas Cleaning System Initial Survey Checklist

Ships Name	IMO Number
GRAND PRINCESS	9104005

Port of Registry

Hamilton

Notes:-

1 Mark boxes 'Yes' for complied with 'No' for not complied with or 'NA' for not applicable
2 Part 1 AA, AB and BA are to be completed for ALL initial surveys
3 Part 2 complete the items for surveying the EGCS for compliance with LR Rule requirements (Pt. 5, Ch. 24)
4 Part 3 complete for surveying the EGCS for compliance with statutory requirements (IMO Res. MEPC.259(68))

Part 1 - General

AA	**General**	
050	EGCS manufacturer	ECOSPRAY
100	EGCS Type/Model	ECO-DE SOX
150	Serial Number(s)	15-477-AC-SC-0200 / 0500 / 0600
200	EGCS exhaust gas flow capacity (m^3/hr)	90,397
250	Engines connected to EGCS	#2, 58.6
250a	Engines max power rating (kW)	11520 kW
300	Boilers connected to EGCS	NONE
300a	Boilers max maximum steaming rate	—
350	The scrubber has been approved in accordance with:	MEPC-259(68), MARPOL VI
350a	MEPC.259(68) Scheme A and SO_x emission compliance certificate sighted?	Yes/No*
350b	MEPC.259(68) Scheme B?	Yes/No*
AB	**National Administration Requirements**	
050	Have the country files been checked to ascertain any flag administration requirements?	Yes/No*
100	Have all flag administration technical and reporting requirements been complied with?	Yes/No*
BA	**Documentation – Design Approval**	
050	Design Appraisal Document issued and all comments closed out?	Yes/No*

Part 2 - Survey of the EGCS

CA	**Class Requirements Survey (Part 5, Chapter 24)**	
	Pumping and piping	
050	Was the system including associated pumps, process tanks, piping and fittings examined for obvious defects and found satisfactory?	Yes/No/NA*
100	Overboard discharge is below the water line of the ship when at its minimum operating draught?	Yes/No/NA*
150	Where plastic piping has been used with bonded pipes then the pipes are joined in accordance with a procedure approved by LR and evidence of the competency of person making such bonds is available for inspection?	Yes/No/NA*
200	Deck and bulkhead penetrations inspected for good workmanship and tightness?	Yes/No/NA*
250	For open loop EGCS, arrangements are in place to protect the system if the over board discharge valve is closed and there is valve position indication at the control station?	Yes/No/NA*
300	Pipes are adequately supported?	Yes/No*
350	As far as practicable, was the operation of the system confirmed? NOTE: this does not require EGCS to operate at full load or with high sulphur fuel and may be demonstrated by running pumps and systems without exhaust gas flow?	Yes/No/NA*
400	Was the operation of the overflow protection arrangement confirmed by test or simulation including alarms and interlocks?	Yes/No/NA*
450	Does the EGCS serve more than one engine?	Yes/No*
450a	If so, an isolation valve is fitted in the exhaust gas duct before the EGCS?	Yes/No/NA*
500	Is the exhaust system fitted with a by-pass for the EGCS?	Yes/No*
500a	If so, has the by-pass valve operation and valve position indication been confirmed?	Yes/No/NA*
550	When the EGCS is running, are back pressure measurements for the exhaust system available?	Yes/No/NA*
550a	Is this back pressure within the maximum permitted levels for connected combustion machinery?	Yes/No*
550b	Where fitted, induced draught fans are functional and in good condition?	Yes/No/NA*

** Delete as appropriate*

Form 1790 (2016.10)

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EPA-2020-000622

	Chemical substances and wash water	
600	Does the EGCS require any chemical substances for operation?	Yes/No*
600a	Have chemical tanks, pumps and associated piping, fittings and transfer arrangements been examined for obvious defects and operation found satisfactory?	Yes/No/NA*
600b	Where applicable chemical tank coatings have been inspected and found in good condition?	Yes/No/NA*
600c	Where applicable, operation of quick closing valves on chemical tanks has been tested?	Yes/No/NA*
600d	Where applicable, chemical tank heating and cooling has been demonstrated to be functioning?	Yes/No/NA*
600e	Chemical and water process tank high and low level protection has been tested, as applicable?	Yes/No/NA*
600f	Chemical tank spill containment arrangements are in place in accordance with applicable LR Rules and in good condition?	Yes/No/NA*
600g	Arrangements are in place for draining, venting, purging and making safe chemical tanks so as to permit safe maintenance and inspection?	Yes/No/NA*
600h	Suitable access arrangements are in place for the EGCS and any associated tanks?	Yes/No/NA*
	Electrical and control equipment	
700	Protection device settings for all outgoing electrical circuits are as per approved plans?	Yes/No*
700a	EGCS emergency stop demonstrated?	Yes/No*
700b	EGCS alarms and audible and visual indicators have been tested as required by the surveyor?	Yes/No*
Part 3	**Statutory Survey Requirements (IMO Res. MEPC.259(68))**	
DA	**Survey – Approved Documents**	
100	Have the following plans and documents been approved by or on behalf of the Flag State with approved copies being available on-board? NOTE: it is accepted that the approved copies may be in electronic format for completion of the survey	
100a	For European flag ships, a MED certificate for the EGCS has been issued (Scheme A - Module B) or will be issued (Scheme B - Module G)?	Yes/No/NA*
100b	The Sulphur Emissions Compliance Plan (SECP)?	Yes/No*
100c	The On-board Monitoring Manual (OMM)?	Yes/No*
100d	The Emissions Technical Manual Scheme A or Scheme B (ETM-A or ETM-B), as applicable?	Yes/No*
100e	The Exhaust Gas Cleaning (EGC) Record book as described in the OMM? NOTE: where it is proposed to use the vessels planned maintenance system to demonstrate compliance with any requirements contained within the approved documents in this section then the format of the electronic records is to be approved.	Yes/No*
100f	Sulphur Emissions Compliance Certificate (SECC)(Scheme A only)?	Yes/No/NA*
100g	Any manuals, instruction books or other documents which are referenced in the SECP, OMM or ETM-A or ETM-B?	Yes/No/NA*
150	The vessel's International Air Pollution Prevention certification has been updated to reference the EGCS?	Yes/No*
200	Has vessel's Flag Administration been notified of EGCS installation completion and update to IAPP?	Yes/No*
DB	**Scheme A Only**	
050	The required sensors, for the continuous monitoring of the parameters listed in the ETM-A, are fitted?	Yes/No/NA*
050a	Records and reports of parameters can be produced in accordance with the ETM-A?	Yes/No/NA*
050b	Compliance checks carried out in accordance with the instructions contained in the ETM-A?	Yes/No/NA*
050c	Any spot checks of emissions included in the ETM-A have been carried out, any required sensors and equipment are installed as stipulated in the ETM-A? NOTE: where a EGCS approved in accordance with Scheme A is fitted with continuous exhaust gas emissions monitoring equipment in order to comply with regional or national regulation (e.g. the European Sulphur Directive) then the arrangements are to be surveyed in accordance with DC.	Yes/No/NA*
100	Checks have been carried out to confirm that the EGCS system is in accordance with the arrangements provided in the ETM-A?	Yes/No/NA*
150	Verification of EGCS compliance completed in accordance with the instructions provided in the ETM-A?	Yes/No/NA*
DC	**Scheme B Only**	
050	The exhaust gas monitoring system has been demonstrated as being in working condition? NOTE: the EGCS is not required to be fully operational to demonstrate that the monitoring system is in working condition. However if the monitoring system requires the EGCS to be in operation to allow verification then the EGCS will be required to be operational	Yes/No/NA*
050a	The zero and span checks were performed as per the OMM? NOTE: manufacturer's commissioning records and calibration certificates are to be used to demonstrate that the equipment has been correctly calibrated for the application.	Yes/No/NA*
050b	Any other operating checks required by the OMM to ensure the required operation of the monitoring system have been performed? NOTE: the system check (calibration/function check without gas) is to be demonstrated.	Yes/No/NA*
100	The required sensors, for the daily spot checks of the parameters listed in the OMM, are fitted?	Yes/No/NA*
150	The data recording components and arrangements for exhaust gas monitoring are as per the OMM?	Yes/No/NA*
150a	The exhaust gas data recording system can produce the reports specified in the OMM?	Yes/No/NA*
150b	Exhaust gas emissions reports inspected and demonstrate compliance with the applicable emission limits?	Yes/No/NA*

** Delete as appropriate*

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DD	Scheme A & Scheme B	
050	The combustion devices to which the EGCS is fitted are in accordance with the description given in the ETM-A or ETM-B, as applicable?	Yes/No*
100	The arrangement of the EGCS and any associated equipment are as given in the ETM-A or ETM-B, as applicable?	Yes/No*
100a	The EGCS washwater monitoring system components and arrangement are as per the OMM, including those applicable to the washwater additives or other substances as identified in the ETM-A or ETM-B as applicable?	Yes/No*
100b	The washwater rate is in accordance with the assumed values used in determining the: a. Polycyclic Aromatic Hydrocarbons (PAH) b. Nitrate limits applicable	Yes/No*
100c	The washwater monitoring system was demonstrated in working conditions? NOTE – This may be demonstrated by running various pumps associated with the system and observing the measured readings	Yes/No*
100d	The zero and span checks of the washwater pH, PAH and turbidity monitors were performed as per the OMM?	Yes/No*
100e	In addition, any other operating checks required by the OMM to ensure the required operation were performed?	Yes/No*
100f	The arrangements are in place for the sampling and analysis of washwater nitrate content?	Yes/No*
100g	Washwater nitrate analysis available and EGC record book updated? NOTE: If nitrate analysis is not available at the time of survey, arrangements are to be made for confirmation at a later date.	Yes/No*
100h	Discharged washwater plume pH measured externally from the ship (at rest in harbour), as applicable?	Yes/No/NA*
100j	Wash water discharge pH has been verified by calculation or modelling as an alternative to physical measurement; details are included within the OMM?	Yes/No/NA*
200	The data recording components and arrangements for washwater are as per the OMM?	Yes/No*
200a	The washwater data recording system can produce the reports specified in the OMM?	Yes/No*
200b	Washwater reports inspected and demonstrate compliance with applicable emission limits?	Yes/No*
300	The workmanship of the monitoring and recording system installation was satisfactory?	Yes/No*
350	Was it confirmed that EGCS audible and visual alarms operate satisfactorily?	Yes/No*
400	Was it confirmed that when applicable sufficient consumables for recording devices are onboard?	Yes/No/NA*
450	The procedures given in the SECP are incorporated in the ships operating procedures?	Yes/No*
450a	Ship safety management system incorporates details of safe working procedures and equipment?	Yes/No*

DE Remarks

None

Surveyed By

Place of Survey Los Angeles SFO - Alaska

Date of Survey 25 - 27 Mar 2017

Wietze Gjaltema
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

** Delete as appropriate*

Form 1790 (2016.10)

United States Coast Guard
USCG Headquarters
Washington, DC
US

Lloyd's Register North America Inc,
1715 114th Ave SE, Ste 120,
Bellevue,
WA98004, USA

PRINCESS CRUISE LINE
Corporate Headquarters
24305 Town Center Drive
Santa Clarita,
CA 91355, USA

Re: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for M/V GRAND PRINCESS IMO 9104005

Ref: USCG-CVC Policy Letter 12-04 of 25 July 2012

Dear CAPT Rand;

In accordance with the requirements of Article 5.b.ii. of the Reference and our telephone call of 12 December, 2014, the following documents are attached for USCG and US EPA review of the proposed approval of the Exhaust Gas Cleaning Systems to be issued on behalf of the Government of Bermuda:

- Copy of ship's IAPP, Article 2.6 endorsement.
- Completed Lloyd's Register Surveyors Checklist for "SOX Scrubber Scheme B".

Lloyd's Register surveyors have observed the safe operation of the EGCS system onboard M/V Grand Princess. We confirm that the Onboard Monitoring Manual (OMM), EGCS Technical Manual – Scheme B (ETMB), and Sulphur Emission Control Plan (SECP) have been reviewed, accepted and stamped by Lloyd's Register. We also confirm that these documents are physically held onboard the ship, and that the manuals have been verified to accurately represent the installed EGC Systems.

We kindly request your confirmation of this submission, which will complete the approval process and use of the system inside the North American Emission Control Area (ECA) during completion of any further USCG/EPA review.

Sincerely,

Lloyd's Register North America, Inc. Lloyd's Register Initials: WG Los Angeles Office

Lloyd's Register

Ian Weightman
Technical Projects Director

Princess Cruise Line

FOR INFORMATION ONLY

Lloyd's Register

LR015.2013.12

Exhaust Gas Cleaning System
Technical Manual – Scheme B

Open-Loop Seawater DeSOx Absorption System 'ECO-DeSOx™' for MV Grand Princess

This Technical Manual describes the Exhaust Gas Cleaning System Scheme B (ETM-B). It has been developed in accordance with the requirements given in the 2015 Guidelines for Exhaust Gas Cleaning Systems – MEPC-259(68) Section 5.6.1

Purchase Order no:	**1008792**
Job number:	**2013_20_APC, 2015-477-APC**
Ship name:	**MV Grand Princess**
IMO number:	**9104005**
System manufactured by:	**Ecospray Technologies S.r.l., Alzano Scrivia, Alessandria, Italy**
Unit model:	**ECO-DeSOx**
Ecospray project no:	**13-020-APC, 15-477-APC**

An EGC System is fitted for SOx emission control purposes to each of the DGs listed below, and each DG has a designated DeSOx Tower:

Diesel Generator no:	1	2	5	6
Location in ship:	Engine Room (Fwd)	Engine Room (Fwd) Port In Board	Engine Room (Aft) Port	Engine Room (Aft) Starboard
Engine:	GMT-SULZER 16ZAV40S	GMT-SULZER 16ZAV40S	GMT-SULZER 16ZAV40S	GMT-SULZER 16ZAV40S
MCR:	11,520 kW	11,520 kW	11,520 kW	11,520 kW
Speed:	514 rpm	514 rpm	514 rpm	514 rpm
Cycle:	4-stroke	4-stroke	4-stroke	4-stroke
DG Serial no:	2037	2038	2041	2042
EGC Tower no:	13-020-APCW-0100-DG1	15-477-APC-SC-0200	15-477-APC-SC-0500	15-477-APC-SC-0600

Approved in accordance with regulation 4 of MARPOL Annex VI as an equivalent means of achieving compliance with regulation 14 of that Annex.

If amendments are necessary to the contents of this Manual, either as replacement or additional pages, these are to be approved by the Administration before implementation.

Client:	**Princess Cruises**
Revision:	**1 March 2017**

Prepared by	Checked by	Approved by
Paolo Feltri	Fabio Calcagno	Maurizio Archetti

Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 11/21/2016 10:42:20 AM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: Greuel, Justin [Greuel.Justin@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]
Subject: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Koningsdam, IMO 9692557
Attachments: MV Koningsdam_IMO 9692557-EGCS Notification Letter-USCG.pdf; MV Koningsdam_IMO 9692557_EGCS Supporting Docs.pdf; MV Koningsdam_IMO 9692557-EGCS Info.pdf

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installations on board **M/V Koningsdam, IMO 9692557**. Please could you acknowledge receipt of this notification.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST
Specialist, Engineering
Engineering Systems & MARPOL Department
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E darren.davies@lr.org

Lloyd's Register Marine & Offshore
Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.
Visit www.lr.org

Working together for a safer world

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International Air Pollution Prevention Certificate

NOTE: This Certificate shall be supplemented by Record of Construction and Equipment No: 9692557/02

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention") **under the authority of the Government of the Netherlands** by Lloyd's Register North America, Inc..

	Particulars of Ship
Name of ship	KONINGSDAM
Distinctive number or letters	PBGJ
Port of registry	ROTTERDAM
Gross tonnage	99,836
IMO number	9692557

This is to certify:

1. that the ship has been surveyed in accordance with regulation 5 of Annex VI of the Convention; and

2. that the survey shows that the equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

Completion date of the survey on which this certificate is 31 March 2016

This certificate is valid until 30 March 2021 subject to surveys in accordance with regulation 5 of Annex VI of the Convention.

Issued at Miami on 18 November 2016

Lloyd's Register North America, Inc.
J. J. Gustafsson
Miami Office
Lloyd's Register

J. Gustafsson
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

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Form 2228 (2015.06)

Endorsement for annual and intermediate surveys

This is to certify that at a survey required by regulation 5 of Annex VI of the Convention the ship was found to comply with the relevant provisions of that Annex:

Annual survey

Signed: _____

Place of survey

Date

Annual/Intermediate* survey

Signed: _____

Place of survey

Date

Annual/Intermediate* survey

Signed: _____

Place of survey

Date

Annual survey

Signed: _____

Place of survey

Date

Annual/Intermediate survey in accordance with regulation 9.8.3

This is to certify that, at an Annual/Intermediate* survey in accordance with regulation 9.8.3 of Annex VI of the Convention, the ship was found to comply with the relevant provisions of that Annex:

Signed: _____

Place of survey

Date

* *Delete as appropriate*

Endorsement to extend the certificate if valid for less than 5 years where regulation 9.3 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.3 of Annex VI of the Convention, be accepted as valid

Signed: _____
Place of survey
Date

Endorsement where the renewal survey has been completed and regulation 9.4 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.4 of Annex VI of the Convention, be accepted as valid

Signed: _____
Place of survey
Date

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 9.5 or 9.6 applies

This certificate shall, in accordance with regulation 9.5 or 9.6* of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement for advancement of anniversary date where regulation 9.8 applies

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date

Signed: _____
Place of survey
Date

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date

Signed: _____
Place of survey
Date

* Delete as appropriate

Record of Construction and Equipment

Supplement to the International Air Pollution Prevention Certificate (IAPP Certificate)

Notes:

1 This Record shall be permanently attached to the IAPP Certificate. The IAPP Certificate shall be available on board the ship at all times.

2 The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.

3 Entries in boxes shall be made by inserting either a cross (X) for the answer "yes" and "applicable" or a (-) for the answers "no" and "not applicable" as appropriate.

4 Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and resolutions or circulars refer to those adopted by the International Maritime Organisation.

1. Particulars of Ship:

1.1	Name of ship	KONINGDAM
1.2	IMO number	9692577
1.3	Date on which keel was laid or ship was at a similar stage of construction	05 December 2013
1.4	Length (L)[1] metres	not applicable

2. Control of emissions from ships

2.1 Ozone depleting substances (regulation 12)

2.1.1 The following fire extinguishing systems, other systems and equipment containing ozone-depleting substances, other than hydro-chlorofluorocarbons (HCFCs), installed before 19 May 2005 may continue in service:

System or equipment	Location on board	Substance

2.1.2 The following systems containing HCFCs installed before 1 January 2020 may continue in service:

System or equipment	Location on board	Substance

[1] *Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely for recreational purposes and to which, in accordance with regulation 13.5.2.1 or regulation 13.5.2.3, the NOx emission limit as given by regulation 13.5.1.1 will not apply.*

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2.2 Nitrogen oxides (NOx) (regulation 13):

2.2.1 The following marine diesel engines installed on this ship are in accordance with the requirements of regulation 13, as indicated:

Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)			Engine #1	Engine #2	Engine #3	Engine #4	Engine #5
1	Manufacturer and model		Caterpillar Motoren Rostock GmbH MaK 12 M 43C	Caterpillar Motoren Rostock GmbH MaK 12 M 43C	Caterpillar Motoren Rostock GmbH MaK 12 M 43C	Caterpillar Motoren Rostock GmbH MaK 12 M 43C	
2	Serial number		69051	69051	69053	69054	
3	Use (applicable application cycle(s) – NTC 3.2)		E2	E2	E2	E2	
4	Rated power (kW) (NTC 1.3.11)		12600	12600	12600	12600	
5	Rated speed (RPM) (NTC 1.3.12)		514	514	514	514	
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2		not applicable	not applicable	not applicable	not applicable	
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2	not applicable	not applicable	not applicable	not applicable	
8b		13.2.1.2 & 13.2.3	not applicable	not applicable	not applicable	not applicable	
8c		13.2.1.3 & 13.2.3	not applicable	not applicable	not applicable	not applicable	
9a	Tier I	13.3	--	--	--	--	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	X	X	X	X	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC 243(66)).

Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)			Engine #6	Engine #7	Engine #8	Engine #9	Engine #10
1	Manufacturer and model						
2	Serial number						
3	Use (applicable application cycle(s) – NTC 3.2)						
4	Rated power (kW) (NTC 1.3.11)						
5	Rated speed (RPM) (NTC 1.3.12)						
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2						
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2					
8b		13.2.1.2 & 13.2.3					
8c		13.2.1.3 & 13.2.3					
9a	Tier I	13.3	--	--	--	--	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

	2.3	Sulphur oxides (SOx) and particulate matter (regulation 14)
	2.3.1	When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:
	2.3.1.1	fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
--		4.50% m/m (not applicable on or after 1 January 2012); or
X		3.50% m/m (not applicable on or after 1 January 2020); or
X		0.50% m/m, and/or
	2.3.1.2	an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:
--		4.50% m/m (not applicable on or after 1 January 2012); or
X		3.50% m/m (not applicable on or after 1 January 2020); or
X		0.50% m/m
	2.3.2	When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:
	2.3.2.1	fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
--		1.00% m/m (not applicable on or after 1 January 2015); or
X		0.10% m/m, and/or
	2.3.2.2	an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:
--		1.00% m/m (not applicable on or after 1 January 2015); or
X		0.10% m/m
	2.4	Volatile organic compounds (VOCs) (regulation 15)
--	2.4.1	The tanker has a vapour collection system installed and approved in accordance with MSC/Circ.585.

Approval certificate number	Approved operations manual	Approving authority	Date

--	2.4.2.1	For a tanker carrying crude oil, there is an approved VOC Management Plan
	2.4.2.2	VOC Management Plan approval reference:

Approval certificate number	Approved operations manual	Approving authority	Date

	2.5	Shipboard incineration (regulation 16)
		The ship has an incinerator:
	2.5.1	installed on or after 1 January 2000 that complies with:
X	2.5.1.1	resolution MEPC.76(40), as amended*

Manufacturer and model	Serial number	Type test certificate number
DEERBERG - SYSTEM MPWMS	1953-DS 1400	MED 000005/M3

--	2.5.1.2	resolution MEPC.244(66)

Manufacturer and model	Serial number	Type test certificate number

* As amended by resolution MEPC.93(45).

2.5.2 Installed before 1 January 2000 that complies with:

2.5.2.1 resolution MEPC.59(33), amended**

Manufacturer and model	Serial number	Type test certificate number

2.5.2.2 resolution MEPC.76(40), amended*

Manufacturer and model	Serial number	Type test certificate number

2.5.3 Installed before 1 January 2000 and which does not comply with resolution MEPC.76(40) as amended or resolution MEPC.59(33) as amended.

Manufacturer and model	Serial number	Type test certificate number

2.6 Equivalents (regulation 4)

The ship has been allowed to use the following fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to that required by this Annex:

System or equipment	Equivalent used	Approval reference	Method
No 2 Diesel Generator	EGC System	MTES/ENG/4402503	IMO Res. MEPC 259(68) Scheme B
No 3 Diesel Generator	EGC System	MTES/ENG/4402503	IMO Res. MEPC 259(68) Scheme B

This is to certify that this Record is correct in all respects.

Issued at Miami on 18 November 2016

Lloyd's Register North America, Inc.
J. J. Gustafsson
Miami Office

Jascha Gustafsson
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

* As amended by resolution MEPC.93(45).
** As amended by resolution MEPC.92(45).

Form 2177 (2016.02)

IMO Number: 9692557

APPROVED

For and on behalf of the Government of the vessel's Registration, as shown in the attached Approval History, and as complying with the Regulations stated below

EXHAUST GAS CLEANING SYSTEM (EGCS)

The information contained in the SOx Emission Compliance Plan (SECP), Onboard Monitoring Manual (OMM), EGC System Technical Manual "Scheme B" (ETM-B) and EGC Record Book have been examined for the compliance with Resolution MEPC.259 (68), Scheme 'B' (Continuous Monitoring with Parameter Checks), in accordance with Regulation 4.1 of the revised MARPOL Annex VI, which allows the use of alternative compliance methods.

No alteration or revision shall be made to any part of this plan without the prior approval of the Lloyd's Register Group.

The Owner remains responsible for the accuracy of the information and details given in OMM, ETM-B, SECP and EGC Record Book.

Signed and stamped _____ Date: 20 April 2016

Surveyor to Lloyd's Register EMEA

A Member of the Lloyd's Register Group

Approval for compliance with MARPOL Annex VI Regulation 4.1 and Resolution MEPC.259 (68), Scheme 'B' is subject to satisfactory on-board survey, which includes functional test and calibration to exhaust gas and wash water monitoring systems.

Signed and stamped J. Gustafsson Date: 18.11.2016

Surveyor to Lloyd's Register North America Inc

A Member of The Lloyd's Register Group

Approval is subject to verification that the arrangements onboard are identical to those described in SECP, OMM and ETM-B.

Signed and stamped J. Gustafsson Date: 18.11.2016

Surveyor to Lloyd's Register North America Inc.

A Member of The Lloyd's Register Group

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IMO No. 9692557

APPROVAL HISTORY

Original approval:

NAME	PORT OF REGISTRY AND FLAG	OFFICIAL NO. OR CALL SIGN	SURVEYOR/DATE
KONINGSDAM	Rotterdam the Netherlands	2016-C-2102 PBGJ	MAX WU 20/4/2016

Changes:

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Exhaust Gas Cleaning System Initial Survey Checklist

Ship Name	IMO Number
Koningsdam	9692557
Port of Registry	
Rotterdam	

Notes:-

1 Mark boxes 'Yes' for complied with 'No' for not complied with or 'NA' for not applicable
2 Part 1 AA, AB and BA are to be completed for ALL initial surveys
3 Part 2 complete the items for surveying the EGCS for compliance with LR Rule requirements (Pt. 5, Ch. 24)
4 Part 3 complete for surveying the EGCS for compliance with statutory requirements (IMO Res. MEPC.259(68))

Part 1 - General

AA	General	
050	EGCS manufacturer	EcoSpray
100	EGCS Type/Model	Eco-DeSOx
150	Serial Number(s)	Tower2-14-079-APC-0010 Tower3 14-079-APC-0110
200	EGCS exhaust gas flow capacity (m^3/hr)	DG2-40839kg/h, DG3-40839kg/h
250	Engines connected to EGCS	DG2-12M43C-69052 DG3-12M43C-69053
250a	Engines max power rating (kW)	DG2-12.6MW DG3 -12.6MW
300	Boilers connected to EGCS	NA
300a	Boilers max maximum steaming rate	NA
350	The scrubber has been approved in accordance with:	
350a	MEPC.259(68) Scheme A and SO_x emission compliance certificate sighted?	No
350b	MEPC.259(68) Scheme B?	Yes
AB	National Administration Requirements	
050	Have the country files been checked to ascertain any flag administration requirements?	Yes
100	Have all flag administration technical and reporting requirements been complied with?	Yes
BA	Documentation - Design Approval	
050	Design Appraisal Document issued and all comments closed out?	Yes

Part 2 - Survey of the EGCS

CA	Class Requirements Survey (Part 5, Chapter 24)	
	Pumping and piping	
050	Was the system including associated pumps, process tanks, piping and fittings examined for obvious defects and found satisfactory?	Yes
100	Overboard discharge is below the water line of the ship when at its minimum operating draught?	Yes
150	Where plastic piping has been used with bonded pipes then the pipes are joined in accordance with a procedure approved by LR and evidence of the competency of person making such bonds is available for inspection?	Yes
200	Deck and bulkhead penetrations inspected for good workmanship and tightness?	Yes
250	For open loop EGCS, arrangements are in place to protect the system if the over board discharge valve is closed and there is valve position indication at the control station?	Yes
300	Pipes are adequately supported?	Yes
350	As far as practicable, was the operation of the system confirmed? NOTE: this does not require EGCS to operate at full load or with high sulphur fuel and may be demonstrated by running pumps and systems without exhaust gas flow?	Yes
400	Was the operation of the overflow protection arrangement confirmed by test or simulation including alarms and interlocks?	Yes
450	Does the EGCS serve more than one engine?	No
450a	If so, an isolation valve is fitted in the exhaust gas duct before the EGCS?	NA
500	Is the exhaust system fitted with a by-pass for the EGCS?	No
500a	If so, has the by-pass valve operation and valve position indication been confirmed?	NA
550	When the EGCS is running, are back pressure measurements for the exhaust system available?	Yes
550a	Is the back pressure within the maximum permitted levels for connected combustion machinery?	Yes
550b	Where fitted, induced draught fans are functional and in good condition?	Yes

** Delete as appropriate*

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	Chemical substances and wash water	
600	Does the EGCS require any chemical substances for operation?	Yes
600a	Have chemical tanks, pumps and associated piping, fittings and transfer arrangements been examined for obvious defects and operation found satisfactory?	NA
600b	Where applicable chemical tank coatings have been inspected and found in good condition?	NA
600c	Where applicable, operation of quick closing valves on chemical tanks has been tested?	NA
600d	Where applicable, chemical tank heating and cooling has been demonstrated to be functioning?	NA
600e	Chemical and water process tank high and low level protection has been tested, as applicable?	NA
600f	Chemical tank spill containment arrangements are in place in accordance with applicable LR Rules and in good condition?	NA
600g	Arrangements are in place for draining, venting, purging and making safe chemical tanks so as to permit safe maintenance and inspection?	NA
600h	Suitable access arrangements are in place for the EGCS and any associated tanks?	NA
	Electrical and control equipment	
700	Protection device settings for all outgoing electrical circuits are as per approved plans?	Yes
700a	EGCS emergency stop demonstrated?	Yes
700b	EGCS alarms and audible and visual indicators have been tested as required by the surveyor?	Yes
Part 3	Statutory Survey Requirements (IMO Res. MEPC.259(68))	
DA	Survey - Approved Documents	
100	Have the following plans and documents been approved by or on behalf of the Flag State with approved copies being available on board? NOTE: it is accepted that the approved copies may be in electronic format for completion of the survey	
100a	For European flag ships, a MED certificate for the EGCS has been issued (Scheme A - Module B) or will be issued (Scheme B -	NA
100b	The Sulphur Emissions Compliance Plan (SECP)?	Yes
100c	The On-board Monitoring Manual (OMM)?	Yes
100d	The Emissions Technical Manual Scheme A or Scheme B (ETM-A or ETM-B), as applicable?	Yes
100e	The Exhaust Gas Cleaning (EGC) Record book as described in the OMM? NOTE: where it is proposed to use the vessels planned maintenance system to demonstrate compliance with any requirements contained within the approved documents in this section then the format of the electronic records is to be approved.	Yes
100f	Sulphur Emissions Compliance Certificate (SECC) (Scheme A only)?	NA
100g	Any manuals, instruction books or other documents which are referenced in the SECP, OMM or ETM-A or ETM-B?	Yes
150	The vessel's International Air Pollution Prevention certification has been updated to reference the EGCS?	Yes
200	Has vessel's Flag Administration been notified of EGCS installation completion and update to IAPP?	Yes
DB	Scheme A Only	
050	The required sensors, for the continuous monitoring of the parameters listed in the ETM-A, are fitted?	NA
050a	Records and reports of parameters can be produced in accordance with the ETM-A?	NA
050b	Compliance checks carried out in accordance with the instructions contained in the ETM-A?	NA
050c	Any spot checks of emissions included in the ETM-A have been carried out, any required sensors and equipment are installed as stipulated in the ETM-A? NOTE: where a EGCS approved in accordance with Scheme A is fitted with continuous exhaust gas emissions monitoring equipment in order to comply with regional or national regulation (e.g. the European Sulphur Directive) then the arrangements are to be surveyed in accordance with DC.	NA
100	Checks have been carried out to confirm that the EGCS system is in accordance with the arrangements provided in the ETM-A?	NA
150	Verification of EGCS compliance completed in accordance with the instructions provided in the ETM-A?	NA
DC	Scheme B Only	
050	The exhaust gas monitoring system has been demonstrated as being in working condition? NOTE: the EGCS is not required to be fully operational to demonstrate that the monitoring system is in working condition. However if the monitoring system requires the EGCS to be in operation to allow verification then the EGCS will be required to be operational	Yes
050a	The zero and span checks were performed as per the OMM? NOTE: manufacturer's commissioning records and calibration certificates are to be used to demonstrate that the equipment has been correctly calibrated for the application.	Yes
050b	Any other operating checks required by the OMM to ensure the required operation of the monitoring system have been performed? NOTE: the system check (calibration/function check without gas) is to be demonstrated.	Yes
100	The required sensors, for the daily spot checks of the parameters listed in the OMM, are fitted?	Yes
150	The data recording components and arrangements for exhaust gas monitoring are as per the OMM?	Yes
150a	The exhaust gas data recording system can produce the reports specified in the OMM?	Yes
150b	Exhaust gas emissions reports inspected and demonstrate compliance with the applicable emission limits?	Yes

** Delete as appropriate*

DD	Scheme A & Scheme B	
050	The combustion devices to which the EGCS is fitted are in accordance with the description given in the ETM-A or ETM-B, as applicable?	Yes
100	The arrangement of the EGCS and any associated equipment are as given in the ETM-A or ETM-B, as applicable?	Yes
100a	The EGCS washwater monitoring system components and arrangement are as per the OMM, including those applicable to the washwater additives or other substances as identified in the ETM-A or ETM-B as applicable?	Yes
100b	The washwater rate is in accordance with the assumed values used in determining the: a. Polycyclic Aromatic Hydrocarbons (PAH) b. Nitrate limits applicable	Yes
100c	The washwater monitoring system was demonstrated in working conditions? NOTE – This may be demonstrated by running various pumps associated with the system and observing the measured readings	Yes
100d	The zero and span checks of the washwater pH, PAH and turbidity monitors were performed as per the OMM?	Yes
100e	In addition, any other operating checks required by the OMM to ensure the required operation were performed?	Yes
100f	The arrangements are in place for the sampling and analysis of washwater nitrate content?	Yes
100g	Washwater nitrate analysis available and EGC record book updated? NOTE: If nitrate analysis is not available at the time of survey, arrangements are to be made for confirmation at a later date.	No
100h	Discharged washwater plume pH measured externally from the ship (at rest in harbour), as applicable?	NA
100j	Wash water discharge pH has been verified by calculation or modelling as an alternative to physical measurement; details are included within the OMM?	Yes
200	The data recording components and arrangements for washwater are as per the OMM?	Yes
200a	The washwater data recording system can produce the reports specified in the OMM?	Yes
200b	Washwater reports inspected and demonstrate compliance with applicable emission limits?	Yes
300	The workmanship of the monitoring and recording system installation was satisfactory?	Yes
350	Was it confirmed that EGCS audible and visual alarms operate satisfactorily?	Yes
400	Was it confirmed that when applicable sufficient consumables for recording devices are onboard?	Yes
450	The procedures given in the SECP are incorporated in the ships operating procedures?	Yes
450a	Ship safety management system incorporates details of safe working procedures and equipment?	Yes

DE Remarks

DA100-MED certificate not required in Caribbean, to be provided for EU season
AA200-Information noted above from Engine Tech Manual, EcoSpray Manual SECP-DG2-85032kg/h(12M43C), SECP-DG3-85032kg/h(12M43C).
CA450-One DG per EGCS.
CA500-Exhaust gas fan equipped with internal by-pass. At idle-open, at load-closed.
CA600-Tank approx 5L containing 5% sulphuric acid solution for connected to EcoSpray automation (1cc for 10sec/8h) for cleaning of the PAH sensor.
DD100b, DD100g-Water samples will be sent to SGS shore side laboratory for analyze 22/11/16

Surveyed By

Place of Survey Miami

Date of Survey 18 November 2016

Lloyd's Register North America, Inc.
J. J. Gustafsson
Miami Office

Jascha Gustafsson
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

* Delete as appropriate

Exhaust Gas Cleaning System
Technical Manual – Scheme B

Open-Loop Seawater DeSOx Absorption System 'ECO-DeSOx™' for MV Koningsdam

This Technical Manual describes the Exhaust Gas Cleaning System Scheme B (ETM-B). It has been developed in accordance with the requirements given in the 2015 Guidelines for Exhaust Gas Cleaning Systems – MEPC-259(68) Section 5.6.1

Purchase Order number:	**41PC9001**
Job number:	**2014_079_APC**
Ship name:	**MV Koningsdam**
IMO number:	**9692557**
System manufactured by:	**Ecospray Technologies S.r.l., Alzano Scrivia, Alessandria, Italy**
Unit model:	**ECO-DeSOx**
Ecospray project number:	**14-079-APC**

An EGC System is fitted for SOx emission control purposes to each of the DGs listed below, and each DG has a designated DeSOx Tower:

Diesel Generator number:	**2**	**3**
Location in ship:	**Stbd Fwd ER Fr 110-138**	**Port Aft ER Fr 82-108**
Engine:	**MaK 12M43C**	**MaK 12M43C**
MCR:	**12,600 kW**	**12,600 kW**
Speed:	**514 rpm**	**514 rpm**
Cycle:	**4-stroke**	**4-stroke**
DG Serial number:	**69052**	**69053**
EGC Tower number:	**14-079-APC-0010**	**14-079-APC-0110**

Approved in accordance with regulation 4 of MARPOL Annex VI as an equivalent means of achieving compliance with regulation 14 of that Annex.

If amendments are necessary to the contents of this Manual, either as replacement or additional pages, these are to be approved by the Administration before implementation.

Client:	**Holland America Line**
Revision:	**1 March 2016**

Prepared by	Checked by	Approved by
Paolo Feltri		
Paolo Feltri	**Fabio Calcagno**	**Maurizio Archetti**

United States Coast Guard
USCG Headquarters
Washington, DC
US

Lloyd's Register North America Inc,
1715 114th Ave SE, Ste 120,
Bellevue,
WA98004, USA

HOLLAND AMERICA LINE
300 Elliott Avenue West
Seattle,
WA 98119, USA

21 Nov 2016

Re: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for M/V KONINGSDAM IMO 9692557

Ref: USCG-CVC Policy Letter 12-04 of 25 July 2012

Dear CAPT Rand;

In accordance with the requirements of Article 5.b.ii. of the Reference and our telephone call of 12 December, 2014, the following documents are attached for USCG and US EPA review of the proposed approval of the Exhaust Gas Cleaning Systems to be issued on behalf of the Government of Netherlands:

- Copy of ship's IAPP, Article 2.6 endorsement.
- Completed Lloyd's Register Surveyors Checklist for "SOX Scrubber Scheme B".

Lloyd's Register surveyors have observed the safe operation of the EGCS system onboard M/V KONINGSDAM Scheme B (ETMB), and Sulphur Emission Control Plan (SECP) have been reviewed, accepted and stamped by Lloyd's Register. We also confirm that these documents are physically held onboard the ship, and that the manuals have been verified to accurately represent the installed EGC Systems.

We kindly request your confirmation of this submission, which will complete the approval process and use of the system inside the North American Emission Control Area (ECA) during completion of any further USCG/EPA review.

Sincerely,

D.L.Davies
Lloyd's Register EMEA

Lloyd's Register

Lloyd's Register

Holland America Line

J.C.Dörr

Message

From: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
Sent: 11/17/2016 1:28:15 PM
To: Davies, Darren [Darren.Davies@lr.org]
CC: Greuel, Justin [Greuel.Justin@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]; Weightman, Ian (PCL) [iweightman@hagroup.com]
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Royal Princess IMO 9584712

Dear Mr. Davies:

Thank you for submitting the documentation for the exhaust gas cleaning systems for the M/V ROYAL PRINCESS.

I will contact you if I have additional questions.

Thank you.

r/Mike Rand

-----Original Message-----
From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Monday, November 14, 2016 4:20 AM
To: Rand, Michael P CIV
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Mavin, Elizabeth; Americas - NASE; Weightman, Ian (PCL)
Subject: [Non-DoD Source] USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Royal Princess IMO 9584712

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installations onboard M/V Royal Princess, IMO 9584712. Please could you acknowledge receipt of this notification.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems & MARPOL Department

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

Lloyd's Register Marine & Offshore

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Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XxmT1-5mnr-hf89f6U5tAarEiN5J59F5tjuLkrCl2-A&m=fRNzw-d5qgpKjXUKSK5oDtty7I5zZnBeIqy50kQNb6I&s=OpsQ0vKa4ZAIx6M170y2Osy1IkOu81xHSbu9KJRuGes&e=>

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Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 7/15/2016 2:33:29 PM
To: Marine-eca [Marine-eca@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line, Carnival UK, Princess Cruises, and Holland America Line - July 2016 Interim Reports
Attachments: HAL Reporting 15 Days After Calendar Quarter July_15_2016_Netherlands.pdf; PCL Reporting 15 Days After Calendar Quarter July_15_2016.pdf; CUK Reporting 15 Days After Calendar Quarter July_15_2016.pdf; CCL Reporting 15 Days After Calendar Quarter July_15_2016_Bahamas.pdf; CCL Reporting 15 Days After Calendar Quarter July_15_2016_Panama.pdf

To Whom It May Concern,
Hope this email finds you well. Attached are the July 2016 Interim Reports regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(b).

Please let us know if we can provide you with any additional information.
Thank you for your continued support.

Sincerely,
Aubrie Brake, Esq.
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 10/4/2016 2:29:42 PM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]; Samulski, Michael [samulski.michael@epa.gov]; paul.topping@tc.gc.ca
CC: Katsumi, Naomi (Naomi.Katsumi@tc.gc.ca) [Naomi.Katsumi@tc.gc.ca]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; tdow@carnival.com; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: RE: Royal Princess progress update

Good Morning Captain Rand, Mr. Samulski, and Mr. Topping,
Thank you all for your approval. We will submit the Royal Princess' Final Report once the installation and flag approval are complete.

We agree that this approval does not alter the other terms of the permit. If the Royal Princess returns to the NA ECA or the US Caribbean Sea ECA before its EGCSs are fully installed and flag approved, we will use ECA compliant MGO fuel oil at all times.

Thank you for your continued support.
Sincerely,
Aubrie Brake, Esq.
Manager - Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

-----Original Message-----
From: Rand, Michael P CIV [mailto:Michael.P.Rand@uscg.mil]
Sent: Tuesday, October 04, 2016 10:17 AM
To: Brake, Aubrie (CarnCorp); Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp); Tombolesi, Emilio (CarnCorp)
Cc: Katsumi, Naomi (Naomi.Katsumi@tc.gc.ca); Michael Samulski (Samulski.Michael@epamail.epa.gov) (Samulski.Michael@epamail.epa.gov); paul.topping@tc.gc.ca
Subject: RE: Royal Princess progress update

Good morning Aubrie:

Transport Canada, the USEPA and the USCG approve Carnival's request to delay the submission of the ROYAL PRINCESS' final report until the installation and flag approval are complete to reflect all relevant information.

This approval does not alter the other terms of the permit. If the ship returns to the North American Emission Control Area (ECA) or the US Caribbean Sea ECA before its EGC Systems are fully installed and flag approved, ECA compliant fuel oil must be used at all times.

Please contact me if you have any questions.

r/Mike Rand

-----Original Message-----
From: Brake, Aubrie (CarnCorp) [mailto:ABrake@carnival.com]
Sent: Monday, October 03, 2016 2:06 PM
To: Rand, Michael P CIV; Michael Samulski (Samulski.Michael@epamail.epa.gov) (Samulski.Michael@epamail.epa.gov); paul.topping@tc.gc.ca
Cc: Katsumi, Naomi (Naomi.Katsumi@tc.gc.ca); Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: [Non-DoD Source] Royal Princess progress update

Good Afternoon Captain Rand, Mr. Samulski, and Mr. Topping,

Hope this email finds you well.

We would like to provide you with an update regarding the progress of Royal Princess' EGCS installations. As reported in the April 2016 Interim Report, the Royal Princess' dry dock was rescheduled to begin in September 2016 due to business reasons, which have delayed the EGCS installations. Since 22 April 2016 the ship has been operating outside of the North American ECA, including through its Exemption expiration on 17 May 2016. The ship is currently planned to return to North American operations in late October, and if it enters the North American ECA at any point before its EGC Systems are fully installed and flag approved, compliant MGO fuel will be used at all times.

The Royal Princess entered into dry dock on 24 September 2016. Its projected EGCS installation completion/commissioning and flag approval date is 06 November, 2016.

As the Royal Princess recently began its dry docking period in Palermo, we have not yet drafted its Final Report. Therefore, if acceptable, we would like to wait to submit the Royal Princess' Final Report until the installation and flag approval are complete to reflect all relevant information.

Thank you for your continued support. Please let us know if we can provide you with any additional information.

Sincerely,

Aubrie Brake, Esq.

Manager - Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com <mailto:abrake@carnival.com>

Message

From: Topping, Paul [paul.topping@tc.gc.ca]
Sent: 10/3/2016 8:23:28 PM
To: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]; Rand, Michael P CIV (Michael.P.Rand@uscg.mil) [Michael.P.Rand@uscg.mil]; Samulski, Michael [samulski.michael@epa.gov]
CC: Katsumi, Naomi [Naomi.Katsumi@tc.gc.ca]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; tdow@carnival.com; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]; Katsumi, Naomi [Naomi.Katsumi@tc.gc.ca]
Subject: Re: Royal Princess progress update

I am OK with their proposal on my end.

Kind regards,

Paul Topping
Manager / Gestionaire
Environmental Protection
Protection de l'environnement
Transport Canada
Transports Canada
Marine Safety and Security
Sécurité et sûreté maritimes

paul.topping@tc.gc.ca
613-991-3168 (Office/Bureau)
613-220-5735 (Cell)

Sent from my BlackBerry 10.
Envoyé de mon BlackBerry 10.
From: Brake, Aubrie (CarnCorp)
Sent: Monday, October 3, 2016 2:06 PM
To: Rand, Michael P CIV (Michael.P.Rand@uscg.mil); Michael Samulski (Samulski.Michael@epamail.epa.gov) (Samulski.Michael@epamail.epa.gov); Topping, Paul
Cc: Katsumi, Naomi; Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: Royal Princess progress update

Good Afternoon Captain Rand, Mr. Samulski, and Mr. Topping,
Hope this email finds you well.
We would like to provide you with an update regarding the progress of Royal Princess' EGCS installations. As reported in the April 2016 Interim Report, the Royal Princess' dry dock was rescheduled to begin in September 2016 due to business reasons, which have delayed the EGCS installations. Since 22 April 2016 the ship has been operating outside of the North American ECA, including through its Exemption expiration on 17 May 2016. The ship is currently planned to return to North American operations in late October, and if it enters the North American ECA at any point before its EGC Systems are fully installed and flag approved, compliant MGO fuel will be used at all times.

The Royal Princess entered into dry dock on 24 September 2016. Its projected EGCS installation completion/commissioning and flag approval date is 06 November, 2016.

As the Royal Princess recently began its dry docking period in Palermo, we have not yet drafted its Final Report. Therefore, if acceptable, we would like to wait to submit the Royal Princess' Final Report until the installation and flag approval are complete to reflect all relevant information.

Thank you for your continued support. Please let us know if we can provide you with any additional information.

Sincerely,
Aubrie Brake, Esq.
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com<mailto:abrake@carnival.com>

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 10/3/2016 6:06:04 PM
To: Rand, Michael P CIV (Michael.P.Rand@uscg.mil) [Michael.P.Rand@uscg.mil]; Samulski, Michael [samulski.michael@epa.gov]; paul.topping@tc.gc.ca
CC: Katsumi, Naomi (Naomi.Katsumi@tc.gc.ca) [Naomi.Katsumi@tc.gc.ca]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; tdow@carnival.com; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Royal Princess progress update

Good Afternoon Captain Rand, Mr. Samulski, and Mr. Topping,
Hope this email finds you well.
We would like to provide you with an update regarding the progress of Royal Princess' EGCS installations. As reported in the April 2016 Interim Report, the Royal Princess' dry dock was rescheduled to begin in September 2016 due to business reasons, which have delayed the EGCS installations. Since 22 April 2016 the ship has been operating outside of the North American ECA, including through its Exemption expiration on 17 May 2016. The ship is currently planned to return to North American operations in late October, and if it enters the North American ECA at any point before its EGC Systems are fully installed and flag approved, compliant MGO fuel will be used at all times.

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Sincerely,
Aubrie Brake, Esq.
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 5/16/2016 2:00:48 PM
To: Marine-eca [Marine-eca@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line - Carnival Glory Final Report
Attachments: Carnival Glory_Final Report_Panama_Confidential.pdf; Attachment A_Carnival Glory Sample Compliance Computer Report_Confidential.pdf; Carnival Glory_Final Report_Panama.pdf

To Whom It May Concern,
Hope this email finds you well.
Attached is the Final Report for the Carnival Glory regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(c). We have provided two versions, one with the confidential business information included ("Carnival Glory Final Report Panama Confidential" and "Attachment A") and the other with all confidential information redacted ("Carnival Glory Final Report Panama").

Please let us know if we can provide you with any additional information.
Thank you for your continued support.
Sincerely,

Aubrie Brake
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Republic of Panama – Final Report

Carnival Corporation:
One (1) Ship Operated by Carnival Cruise Line
Carnival Glory

Refs: MARPOL Annex VI, Regulation 3.2;
Permit to Allow Trials for Ship Emission
Reduction and Control Technology Research,
Section E(1)(c)

1. The Company's experience:
General:
The Carnival Glory (Glory) has three EGCSs that can operate individually or simultaneously. During any run, with as many as three engines, the ship will be able to run its EGCSs on all running engines and meet the Emission Control Area requirement.

As with all Scheme B systems, the Glory system is conducting continuous monitoring of SOx emissions with an installed gas analyzer by Consilium. The ship is also continuously monitoring the quality of the washwater by analyzing data from pH, PAH, and Turbidity instruments. This data is recorded continuously (every 3 minutes) into a Compliance Computer. The recorded data is matched with GMT time from the ship's master clock and ship's GPS coordinates to create an accurate record of both routine operations and special events, such as alarms.

Lloyd's Register approved the EGCSs on behalf of the Panamanian flag administration on 17 March 2016.

2. Information provided in Interim Reports:
Each quarterly Interim Report included fuel sulphur levels and calculations depicting the year-to-date average sulphur content and a summary of the sulphur levels for that quarter.

The average sulphur content for 2014:

Section C(5) Requirement	S. ATLANTIC 2.8000%
Sum of % Sulphur	
Row Labels	South Atlantic
2014	
Glory	2.4518%

The average sulphur content for 2015:

Section C(5) Requirement	S. ATLANTIC 2.8000%
Sum of % Sulphur	
Row Labels	South Atlantic
2015	
Glory	1.4812%

The average sulphur content for 2016:

Section C(5) Requirement	S. ATLANTIC 2.8000%
Sum of % Sulphur	
Row Labels	South Atlantic
2016	
Glory	1.3720%

3. Certification:
Based on information and belief formed after reasonable inquiry, the statements and information contained in this document are true, accurate, and complete.

Name: Capt. Emilio Tombolesi

Date: 16 May 2016

Title: Director Environmental Policy, Carnival Corporation

Signature:

Message

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 8/2/2016 3:04:35 PM
To: Samulski, Michael [samulski.michael@epa.gov]; michael.P.Rand@uscg.mil
CC: tdow@carnival.com; Brake, Aubrie (CarnCorp) [ABrake@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]; Kanzleiter, Ross (CCL) [RKanzleiter@carnival.com]
Subject: Carnival LIBERTY & DREAM engine repairs

Dear Mike and Mike;
In response to yesterday's question about the specifics of the Carnival LIBERTY and Carnival DREAM diesel-generator (DG) problems:

Ex. 4 CBI

I hope this fills in some of the gaps,
Regards,
Mike

Message

From: Davies, Darren [Darren.Davies@lr.org]
Sent: 8/2/2016 2:29:51 PM
To: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
CC: Greuel, Justin [Greuel.Justin@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Millman, Chris (CarnCorp) [CMillman@carnival.com]; Mitchell, Alastair (CarnCorp) [AMitchell@carnival.com]; Kanzleiter, Ross (CCL) [RKanzleiter@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Mavin, Elizabeth [elizabeth.mavin@lr.org]; Americas - NASE [americas.nase@lr.org]
Subject: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Sunshine IMO 9070058
Attachments: MV Carnival Sunshine-IMO 9070058-EGCS Supporting Docs-USCG.pdf; MV Carnival Sunshine-IMO 9070058-Signed Letter of proposal-USCG.pdf

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installed on M/V Carnival Sunshine, IMO 9070058. Please could you acknowledge receipt of this notification.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST
Specialist, Engineering
Engineering Systems
Southampton Technical Support Office (TSO)
Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E darren.davies@lr.org

Lloyd's Register Marine & Offshore
Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.
Visit www.lr.org

Working together for a safer world

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International Air Pollution Prevention Certificate

NOTE: This Certificate shall be supplemented by Record of Construction and Equipment No: 9070058/12

Issued under the provisions of the Protocol of 1997, as amended by resolution MEPC.176(58) in 2008, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 related thereto (hereinafter referred to as "the Convention") **under the authority of the Government of the Commonwealth of The Bahamas** by Lloyd's Register North America, Inc..

	Particulars of Ship
Name of ship	CARNIVAL SUNSHINE
Distinctive number or letters	C6FN4
Port of registry	NASSAU
Gross tonnage	103,881
IMO number	9070058

This is to certify:

1. that the ship has been surveyed in accordance with regulation 5 of Annex VI of the Convention; and

2. that the survey shows that the equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

Completion date of the survey on which this certificate is based: 13 September 2014

This certificate is valid until 16 October 2016 subject to surveys in accordance with regulation 5 of Annex VI of the Convention.

Issued at Miami on 28 July 2016

Lloyd's Register North America, Inc
J. J. Gustafsson
Miami Office
Lloyd's Register

J. Gustafsson
Surveyor to Lloyd's Register North America, Inc.

A subsidiary of Lloyd's Register Group Limited

FOR INFORMATION ONLY
Retained as supporting documentation
Lloyd's Register

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Endorsement for annual and intermediate surveys

This is to certify that at a survey required by regulation 5 of Annex VI of the Convention the ship was found to comply with the relevant provisions of that Annex:

Annual survey

Signed:
Place of survey Maimi
Date 25 August 2012

Lloyd's Register North America, Inc
J. J. Gustafsson
Miami Office
Lloyd's Register

For A. Cacho

Annual* survey

Signed:
Place of survey Venice
Date 09 September 2013

Lloyd's Register North America, Inc
J. J. Gustafsson
Miami Office
Lloyd's Register

For C. Percivale

Intermediate* survey

Signed:
Place of survey Port Canaveral
Date 13 September 2014

Lloyd's Register North America, Inc
J. J. Gustafsson
Miami Office
Lloyd's Register

Allan Turner

Annual survey

Signed:
Place of survey
Date

Annual/Intermediate survey in accordance with regulation 9.8.3

This is to certify that, at an Annual/Intermediate* survey in accordance with regulation 9.8.3 of Annex VI of the Convention, the ship was found to comply with the relevant provisions of that Annex:

Signed:
Place of survey
Date

* *Delete as appropriate*

EPA-2020-000622

Endorsement to extend the certificate if valid for less than 5 years where regulation 9.3 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.3 of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement where the renewal survey has been completed and regulation 9.4 applies

The ship complies with the relevant provisions of the Annex, and this certificate shall, in accordance with regulation 9.4 of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 9.5 or 9.6 applies

This certificate shall, in accordance with regulation 9.5 or 9.6* of Annex VI of the Convention, be accepted as valid until

Signed: _____
Place of survey
Date

Endorsement for advancement of anniversary date where regulation 9.8 applies

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: _____
Place of survey
Date

In accordance with regulation 9.8 of Annex VI of the Convention, the new anniversary date is:

Signed: _____
Place of survey
Date

** Delete as appropriate*

Form 2228 (2013.12)

ED_004159_00042764-00003

Record of Construction and Equipment

Supplement to the International Air Pollution Prevention Certificate (IAPP Certificate)

Notes:

1 This Record shall be permanently attached to the IAPP Certificate. The IAPP Certificate shall be available on board the ship at all times.

2 The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.

3 Entries in boxes shall be made by inserting either a cross (X) for the answer "yes" and "applicable" or a (-) for the answers "no" and "not applicable" as appropriate.

4 Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and resolutions or circulars refer to those adopted by the International Maritime Organisation.

1. Particulars of Ship:

1.1	Name of ship	CARNIVAL SUNSHINE
1.2	IMO number	9070058
1.3	Date on which keel was laid or ship was at a similar stage of construction	30 January 1995
1.4	Length (L)[1] metres	Not Applicable.

2. Control of emissions from ships

2.1 Ozone depleting substances (regulation 12)

2.1.1 The following fire extinguishing systems, other systems and equipment containing ozone-depleting substances, other than hydro-chlorofluorocarbons (HCFCs), installed before 19 May 2005 may continue in service:

System or equipment	Location on board	Substance

2.1.2 The following systems containing HCFCs installed before 1 January 2020 may continue in service:

System or equipment	Location on board	Substance
A/C Machinery - Accomodation - Graco	Engine Room MFZ 5	R22
A/C Machinery - Engine Spaces	Engine Room MFZ 2	R22
Provisions Freezer and Chiller units	Engine Room MFZ 2	R22
Bar/Pantry Refrigeraton	Fan Room 6.6 MFZ 7	R22
Morgue Refrigeration Unit	Bosuns Store Deck 1 MFZ 7	R22

[1] *Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely for recreational purposes and to which, in accordance with regulation 13.5.2.1 or regulation 13.5.2.3, the NOx emission limit as given by regulation 13.5.1.1 will not apply.*

Lloyd's Register Group Limited, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as 'Lloyd's Register'. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.

2.2 Nitrogen oxides (NOx) (regulation 13):

2.2.1 The following marine diesel engines installed on this ship are in accordance with the requirements of regulation 13, as indicated:

	Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)		Engine #1	Engine #2	Engine #3	Engine #4	Engine #5
1	Manufacturer and model						
2	Serial number						
3	Use (applicable application cycle(s) – NTC 3.2)						
4	Rated power (kW) (NTC 1.3.11)						
5	Rated speed (RPM) (NTC 1.3.12)						
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2						
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2					
8b		13.2.1.2 & 13.2.3					
8c		13.2.1.3 & 13.2.3					
9a	Tier I	13.3	--	--	--	--	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	--	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

	Applicable regulation of MARPOL Annex VI (NTC = NOx Technical Code 2008) (AM = Approved Method)		Engine #6	Engine #7	Engine #8	Engine #9	Engine #10
1	Manufacturer and model			CATERPILLER 3516			
2	Serial number			S2R00461			
3	Use (applicable application cycle(s) – NTC 3.2)			D2			
4	Rated power (kW) (NTC 1.3.11)			1901			
5	Rated speed (RPM) (NTC 1.3.12)			1800			
6	Identical engine installed ≥ 1/1/2000 exempted by 13.1.1.2		--	--	--	--	--
7	Identical engine installation date (dd/mm/yyyy) as per 13.1.1.2			Not applicable			
8a	Major Conversion (dd/mm/yyyy)	13.2.1.1 & 13.2.2		06/05/2013			
8b		13.2.1.2 & 13.2.3		Not Applicable			
8c		13.2.1.3 & 13.2.3		Not Applicable			
9a	Tier I	13.3	--	X	--	--	--
9b		13.2.2	--	--	--	--	--
9c		13.2.3.1	--	--	--	--	--
9d		13.2.3.2	--	--	--	--	--
9e		13.7.1.2	--	--	--	--	--
10a	Tier II	13.4	--	X	--	--	--
10b		13.2.2	--	--	--	--	--
10c		13.2.2 (Tier III not possible)	--	--	--	--	--
10d		13.2.3.2	--	--	--	--	--
10e		13.5.2 (Exemptions)	--	--	--	--	--
10f		13.7.1.2	--	--	--	--	--
11a	Tier III (ECA-NOx only)	13.5.1.1	--	--	--	--	--
11b		13.2.2	--	--	--	--	--
11c		13.2.3.2	--	--	--	--	--
11d		13.7.1.2	--	--	--	--	--
12	AM*	installed	--	--	--	--	--
13		not commercially available at this survey	--	--	--	--	--
14		not applicable	--	--	--	--	--

* Refer to the 2014 Guidelines on the approved method process (resolution MEPC.243(66)).

	2.3	Sulphur oxides (SOx) and particulate matter (regulation 14)
	2.3.1	When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:
	2.3.1.1	fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
--		4.50% m/m (not applicable on or after 1 January 2012); or
X		3.50% m/m (not applicable on or after 1 January 2020); or
X		0.50% m/m, and/or
	2.3.1.2	an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:
--		4.50% m/m (not applicable on or after 1 January 2012); or
X		3.50% m/m (not applicable on or after 1 January 2020); or
X		0.50% m/m
	2.3.2	When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:
	2.3.2.1	fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:
--		1.00% m/m (not applicable on or after 1 January 2015); or
X		0.10% m/m, and/or
	2.3.2.2	an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:
--		1.00% m/m (not applicable on or after 1 January 2015); or
X		0.10% m/m
	2.4	Volatile organic compounds (VOCs) (regulation 15)
--	2.4.1	The tanker has a vapour collection system installed and approved in accordance with MSC/Circ.585.

Approval certificate number	Approved operations manual	Approving authority	Date

--	2.4.2.1	For a tanker carrying crude oil, there is an approved VOC Management Plan
	2.4.2.2	VOC Management Plan approval reference:

Approval certificate number	Approved operations manual	Approving authority	Date

	2.5	Shipboard incineration (regulation 16)
		The ship has an incinerator:
	2.5.1	installed on or after 1 January 2000 that complies with:
--	2.5.1.1	resolution MEPC.76(40), as amended*

Manufacturer and model	Serial number	Type test certificate number

X	2.5.1.2	resolution MEPC.244(66)

Manufacturer and model	Serial number	Type test certificate number

* As amended by resolution MEPC.93(45).

2.5.2 installed before 1 January 2000 that complies with:

X 2.5.2.1 resolution MEPC.59(33), amended**

Manufacturer and model	Serial number	Type test certificate number
Scanship Enegineering SE-1400 kW	SE963802	DNV-MED B-965

-- 2.5.2.2 resolution MEPC.76(40), amended*

Manufacturer and model	Serial number	Type test certificate number

-- 2.5.3 installed before 1 January 2000 and which does not comply with resolution MEPC.76(40) as amended or resolution MEPC.59(33) as amended.

Manufacturer and model	Serial number	Type test certificate number

2.6 Equivalents (regulation 4)

The ship has been allowed to use the following fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to that required by this Annex:

System or equipment	Equivalent used	Approval reference	Method
No 1 Diesel Generator	EGCS System	SOUTO-WP26471672	IMO Res. MEPC 259(68) Scheme B
No 2 Diesel Generator	EGCS System	SOUTO-WP26471672	IMO Res. MEPC 259(68) Scheme B
No 3 Diesel Generator	EGCS System	SOUTO-WP26471672	IMO Res. MEPC 259(68) Scheme B

This is to certify that this Record is correct in all respects.

Issued at Miami on 28 July 2016

Lloyd's Register North America, Inc
J. J. Gustafsson
Miami Office
Lloyd's Register

J. Gustafsson
Surveyor to Lloyd's Register North America, Inc.

a member of the Lloyd's Register group.

* As amended by resolution MEPC.93(45).
** As amended by resolution MEPC.92(45).

Form 2177 (2016.02)

IMO Number: 9070058

APPROVED

For and on behalf of the Government of the vessel's Registration, as shown in the attached Approval History, as complying with the Regulations stated below

EXHAUST GAS CLEANING (EGC) SYSTEM

The information contained in the SOx Emission Compliance Plan (SECP), Onboard Monitoring Manual (OMM) and EGC System Technical Manual "Scheme B" (ETM-B) have been examined for the compliance with Resolution MEPC. 259(68), Scheme 'B' (Continuous Monitoring with Parameter Checks), in accordance with Regulation 4.1 of the revised Marpol Annex VI, which allows the use of alternative compliance methods.

No alteration or revision shall be made to any part of this plan without the prior approval of the Lloyd's Register Group.

The Owner remains responsible for the accuracy of the information and details given in OMM, ETM-B and SECP.

20 Jul 2016
Nouman Siddiqui
Marine Technology and Engineering Services
Lloyd's Register EMEA
Lloyd's Register Marine

Signed: _____ Date: 20 July 2016

Surveyor to Lloyd's Register EMEA

A Member of The Lloyd's Register Group

Approval for compliance with Marpol Annex VI Regulation 4.1 and Resolution MEPC. 259(68), Scheme 'B' is subject to satisfactory onboard survey, which includes functional test and calibration of exhaust gas and wash water monitoring systems.

Lloyd's Register North America, Inc
J. J. Gustafsson
Miami Office
Lloyd's Register

Signed J. Gustafsson Date: 28 July 2016

Surveyor to Lloyd's Register ..... North America Inc

A Member of The Lloyd's Register Group

Approval is subject to verification that the arrangements onboard are identical to those described in SECP, OMM and ETM-B.

Lloyd's Register North America, Inc
J. J. Gustafsson
Miami Office
Lloyd's Register

Signed J. Gustafsson Date: 28 July 2016

Surveyor to Lloyd's Register ..... North America Inc

A Member of The Lloyd's Register Group

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IMO No. 9070058

APPROVAL HISTORY			
Original approval:			
NAME	PORT OF REGISTRY AND FLAG	OFFICIAL NO. OR CALL SIGN	SURVEYOR/DATE
"CARNIVAL SUNSHINE"	NASSAU BAHAMAS	C6FN4	20 Jul 2016 Nouman Siddiqui Lloyd's Register Marine Marine Technology and Engineering Services Lloyd's Register EMEA Nouman Ahmad Siddiqui 20 July 2016
Changes:			

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Exhaust Gas Cleaning System Initial Survey Checklist

Ships Name
Carnival Sunshine

IMO Number
9070058

Port of Registry
Bahamas

Notes:-

1 Mark boxes 'Yes' for complied with 'No' for not complied with or 'NA' for not applicable
2 Part 1 AA, AB and BA are to be completed for ALL initial surveys
3 Part 2 complete the items for surveying the EGCS for compliance with LR Rule requirements (Pt. 5, Ch. 24)
4 Part 3 complete for surveying the EGCS for compliance with statutory requirements (IMO Res. MEPC.259(68))

Part 1 - General

AA General

050	EGCS manufacturer	EcoSpray
100	EGCS Type/Model	ECO-DeSOx
150	Serial Number(s)	DG1-15-030-APCW-0100, DG2-15-030-APCW-0200, DG3-15-030-APCWC-0300
200	EGCS exhaust gas flow capacity (m^3/hr)	DG1-76836kg/h, DG2-59818kg/h, DG3-76836kg/h
250	Engines connected to EGCS	DG1-1985, DG2-1989, DG3-1986
250a	Engines max power rating (kW)	DG1-11520kW, DG2-8640KW, DG3-11520kW
300	Boilers connected to EGCS	NA
300a	Boilers max maximum steaming rate	NA
350	The scrubber has been approved in accordance with;	
350a	MEPC.259(68) Scheme A and SO_x emission compliance certificate sighted?	No
350b	MEPC.259(68) Scheme B?	Yes

AB National Administration Requirements

050	Have the country files been checked to ascertain any flag administration requirements?	Yes
100	Have all flag administration technical and reporting requirements been complied with?	Yes

BA Documentation – Design Approval

050	Design Appraisal Document issued and all comments closed out?	Yes

Part 2 - Survey of the EGCS

CA Class Requirements Survey (Part 5, Chapter 24)

Pumping and piping

050	Was the system including associated pumps, process tanks, piping and fittings examined for obvious defects and found satisfactory?	Yes
100	Overboard discharge is below the water line of the ship when at its minimum operating draught?	Yes
150	Where plastic piping has been used with bonded pipes then the pipes are joined in accordance with a procedure approved by LR and evidence of the competency of person making such bonds is available for inspection?	Yes
200	Deck and bulkhead penetrations inspected for good workmanship and tightness?	Yes
250	For open loop EGCS, arrangements are in place to protect the system if the over board discharge valve is closed and there is valve position indication at the control station?	Yes
300	Pipes are adequately supported?	Yes
350	As far as practicable, was the operation of the system confirmed? NOTE: this does not require EGCS to operate at full load or with high sulphur fuel and may be demonstrated by running pumps and systems without exhaust gas flow?	Yes
400	Was the operation of the overflow protection arrangement confirmed by test or simulation including alarms and interlocks?	Yes
450	Does the EGCS serve more than one engine?	No
450a	If so, an isolation valve is fitted in the exhaust gas duct before the EGCS?	NA
500	Is the exhaust system fitted with a by-pass for the EGCS?	No
500a	If so, has the by-pass valve operation and valve position indication been confirmed?	NA
550	When the EGCS is running, are back pressure measurements for the exhaust system available?	Yes
550a	Is this back pressure within the maximum permitted levels for connected combustion machinery?	Yes
550b	Where fitted, induced draught fans are functional and in good condition?	NA

** Delete as appropriate*

Lloyd's Register Group Limited, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as 'Lloyd's Register'. Lloyd's Register assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.

	Chemical substances and wash water	
600	Does the EGCS require any chemical substances for operation?	No
600a	Have chemical tanks, pumps and associated piping, fittings and transfer arrangements been examined for obvious defects and operation found satisfactory?	NA
600b	Where applicable chemical tank coatings have been inspected and found in good condition?	NA
600c	Where applicable, operation of quick closing valves on chemical tanks has been tested?	NA
600d	Where applicable, chemical tank heating and cooling has been demonstrated to be functioning?	NA
600e	Chemical and water process tank high and low level protection has been tested, as applicable?	NA
600f	Chemical tank spill containment arrangements are in place in accordance with applicable LR Rules and in good condition?	NA
600g	Arrangements are in place for draining, venting, purging and making safe chemical tanks so as to permit safe maintenance and inspection?	NA
600h	Suitable access arrangements are in place for the EGCS and any associated tanks?	NA
	Electrical and control equipment	
700	Protection device settings for all outgoing electrical circuits are as per approved plans?	Yes
700a	EGCS emergency stop demonstrated?	Yes
700b	EGCS alarms and audible and visual indicators have been tested as required by the surveyor?	Yes
Part 3	Statutory Survey Requirements (IMO Res. MEPC.259(68))	
DA	Survey – Approved Documents	
100	Have the following plans and documents been approved by or on behalf of the Flag State with approved copies being available on-board? NOTE: it is accepted that the approved copies may be in electronic format for completion of the survey	
100a	For European flag ships, a MED certificate for the EGCS has been issued has been issued?	NA
100b	The Sulphur Emissions Compliance Plan (SECP)?	Yes
100c	The On-board Monitoring Manual (OMM)?	Yes
100d	The Emissions Technical Manual Scheme A or Scheme B (ETM-A or ETM-B), as applicable?	Yes
100e	The Exhaust Gas Cleaning (EGC) Record book as described in the OMM? NOTE: where it is proposed to use the vessels planned maintenance system to demonstrate compliance with any requirements contained within the approved documents in this section then the format of the electronic records is to be approved.	Yes
100f	Sulphur Emissions Compliance Certificate (SECC),(Scheme A only)?	NA
100g	Any manuals, instruction books or other documents which are referenced in the SECP, OMM or ETM-A or ETM-B?	Yes
150	The vessel's International Air Pollution Prevention certification has been updated to reference the EGCS?	Yes
200	Has vessel's Flag Administration been notified of EGCS installation completion and update to IAPP?	Yes
DB	Scheme A Only	
050	The required sensors, for the continuous monitoring of the parameters listed in the ETM-A, are fitted?	NA
050a	Records and reports of parameters can be produced in accordance with the ETM-A?	NA
050b	Compliance checks carried out in accordance with the instructions contained in the ETM-A?	NA
050c	Any spot checks of emissions included in the ETM-A have been carried out, any required sensors and equipment are installed as stipulated in the ETM-A? NOTE: where a EGCS approved in accordance with Scheme A is fitted with continuous exhaust gas emissions monitoring equipment in order to comply with regional or national regulation (e.g. the European Sulphur Directive) then the arrangements are to be surveyed in accordance with DC.	NA
100	Checks have been carried out to confirm that the EGCS system is in accordance with the arrangements provided in the ETM-A?	NA
150	Verification of EGCS compliance completed in accordance with the instructions provided in the ETM-A?	NA
DC	Scheme B Only	
050	The exhaust gas monitoring system has been demonstrated as being in working condition? NOTE: the EGCS is not required to be fully operational to demonstrate that the monitoring system is in working condition. However if the monitoring system requires the EGCS to be in operation to allow verification then the EGCS will be required to be operational	Yes
050a	The zero and span checks were performed as per the OMM? NOTE: manufacturer's commissioning records and calibration certificates are to be used to demonstrate that the equipment has been correctly calibrated for the application.	Yes
050b	Any other operating checks required by the OMM to ensure the required operation of the monitoring system have been performed? NOTE: the system check (calibration/function check without gas) is to be demonstrated.	Yes
100	The required sensors, for the daily spot checks of the parameters listed in the OMM, are fitted?	Yes
150	The data recording components and arrangements for exhaust gas monitoring are as per the OMM?	Yes
150a	The exhaust gas data recording system can produce the reports specified in the OMM?	Yes
150b	Exhaust gas emissions reports inspected and demonstrate compliance with the applicable emission limits?	Yes

** Delete as appropriate*

DD	Scheme A & Scheme B	
050	The combustion devices to which the EGCS is fitted are in accordance with the description given in the ETM-A or ETM-B, as applicable?	Yes
100	The arrangement of the EGCS and any associated equipment are as given in the ETM-A or ETM-B, as applicable?	Yes
100a	The EGCS washwater monitoring system components and arrangement are as per the OMM, including those applicable to the washwater additives or other substances as identified in the ETM-A or ETM-B as applicable?	Yes
100b	The washwater rate is in accordance with the assumed values used in determining the: a. Polycyclic Aromatic Hydrocarbons (PAH) b. Nitrate limits applicable	Yes
100c	The washwater monitoring system was demonstrated in working conditions? NOTE – This may be demonstrated by running various pumps associated with the system and observing the measured readings	Yes
100d	The zero and span checks of the washwater pH, PAH and turbidity monitors were performed as per the OMM?	Yes
100e	In addition, any other operating checks required by the OMM to ensure the required operation were performed?	Yes
100f	The arrangements are in place for the sampling and analysis of washwater nitrate content? Washwater nitrate analysis available and EGC record book updated? NOTE: If nitrate analysis is not available at the time of survey, arrangements are to be made for confirmation at a later date.	Yes
100g	Discharged washwater plume pH measured externally from the ship (at rest in harbour), as applicable?	NA
100h	Wash water discharge pH has been verified by calculation or modelling as an alternative to physical measurement; details are included within the OMM?	Yes
200	The data recording components and arrangements for washwater are as per the OMM?	Yes
200a	The washwater data recording system can produce the reports specified in the OMM?	Yes
200b	Washwater reports inspected and demonstrate compliance with applicable emission limits?	Yes
300	The workmanship of the monitoring and recording system installation was satisfactory?	Yes
350	Was it confirmed that EGCS audible and visual alarms operate satisfactorily?	Yes
400	Was it confirmed that when applicable sufficient consumables for recording devices are onboard?	Yes
450	The procedures given in the SECP are incorporated in the ships operating procedures?	Yes
450a	Ship safety management system incorporates details of safe working procedures and equipment?	Yes

DE Remarks

BA50-Gas trap after tower and Filtrex unit after tower installed but not in use EGCS1-2-3. CA400-Interlocks not fully programmed. CA450-One EGCS tower per engine. CA600-Tank apprx 5L containing 5% sulphuric accid solution for connected to EcoSpray automation (1cc for 10sec/8h) for cleaning of the PAH sensor.

Surveyed By

Place of Survey Miami

Date of Survey 28 JULY 2016

Lloyd's Register North America Inc
J. J. Gustafsson
Miami Office
Lloyd's Register

Jascha Gustafsson
Surveyor to Lloyd's Register North America Inc.

a member of the Lloyd's Register group.

** Delete as appropriate*

United States Coast Guard
USCG Headquarters
Washington, DC
US

Lloyd's Register North America Inc,
1715 114th Ave SE, Ste 120,
Bellevue,
WA98004, USA

CARNIVAL CRUISE LINES
Carnival Place
3655 NW 87th Avenue
Miami,
FL 33178, USA

Re: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for M/V CARNIVAL SUNSHINE, IMO 9070058.

Ref: USCG-CVC Policy Letter 12-04 of 25 July 2012

Dear CAPT Rand;

In accordance with the requirements of Article 5.b.ii. of the Reference and our telephone call of 12 December, 2014, the following documents are attached for USCG and US EPA review of the proposed approval of the Exhaust Gas Cleaning Systems to be issued on behalf of the Government of Bahamas:

- Copy of ship's IAPP, Article 2.6 endorsement.
- Completed Lloyd's Register Surveyors Checklist for "SOX Scrubber Scheme B".

Lloyd's Register surveyors have observed the safe operation of the EGCS system onboard M/V Carnival SUNSHINE. We confirm that the Onboard Monitoring Manual (OMM), EGCS Technical Manual – Scheme B (ETMB), and Sulphur Emission Control Plan (SECP) have been reviewed, accepted and stamped by Lloyd's Register. We also confirm that these documents are physically held onboard the ship, and that the manuals have been verified to accurately represent the installed EGC Systems.

We kindly request your confirmation of this submission, which will complete the approval process and use of the system inside the North American Emission Control Area (ECA) during completion of any further USCG/EPA review.

Sincerely,

Lloyd's Register EMEA

Darren Davies
Lloyd's Register EMEA

Lloyd's Register

Carnival Cruise Lines

Appointment

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 8/1/2016 12:04:51 PM
To: Samulski, Michael [samulski.michael@epa.gov]

Subject: Accepted: Call with EPA/USCG/Carnival
Location: Ex. 6 Personal Privacy (PP) passcode Ex. 6 Personal Privacy (PP)

Start: 8/1/2016 3:00:00 PM
End: 8/1/2016 3:30:00 PM
Show Time As: Busy

Recurrence: (none)

Appointment

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 8/1/2016 11:42:58 AM
To: Samulski, Michael [samulski.michael@epa.gov]

Subject: Accepted: Call with EPA/USCG/Carnival
Location: Ex. 6 Personal Privacy (PP) passcode Ex. 6 Personal Privacy (PP)

Start: 8/1/2016 3:00:00 PM
End: 8/1/2016 3:30:00 PM
Show Time As: Busy

Recurrence: (none)

Message

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 7/28/2016 7:52:30 PM
To: tdow@carnival.com; 'Michael.P.Rand@uscg.mil' [Michael.P.Rand@uscg.mil]; Samulski, Michael [samulski.michael@epa.gov]
Subject: RE: Request for Carnival Liberty and Dream

Tom, Mike, and Mike -- am available at your convenience.

-----Original Message-----
From: Dow, Thomas (CarnCorp)
Sent: Thursday, July 28, 2016 2:52 PM
To: 'Michael.P.Rand@uscg.mil'; 'samulski.michael@epa.gov'
Cc: Kaczmarek, Michael (CarnCorp)
Subject: Re: Request for Carnival Liberty and Dream

Captain Rand and Mike,
Tuesday works for me as well. Checking by copy with Mike K.
Regards,

Tom

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Rand, Michael P CIV [mailto:Michael.P.Rand@uscg.mil]
Sent: Thursday, July 28, 2016 08:54 AM
To: Samulski, Michael <samulski.michael@epa.gov>; Dow, Thomas (CarnCorp)
Subject: RE: Request for Carnival Liberty and Dream

Good morning:

I have two short appointments Monday (10:00 to 10:30, and 12:30 to 1:00). Otherwise, I am free.

I am also free on Tuesday.

r/Mike

-----Original Message-----
From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Thursday, July 28, 2016 8:02 AM
To: tdow@carnival.com
Cc: Rand, Michael P CIV
Subject: [Non-DoD Source] RE: Request for Carnival Liberty and Dream

Tom,

I was out of the office earlier this week and just read the Carnival request this morning. I see that you are unavailable today and tomorrow. Maybe we can talk on Monday?

Thanks,

Mike

****

Michael Samulski

U.S. Environmental Protection Agency

Office of Transportation and Air Quality

Director, Large Marine and Aircraft Center

1 (734) 214-4532

samulski.michael@epa.gov

****

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Tuesday, July 26, 2016 4:31 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Subject: FW: Request for Carnival Liberty and Dream

Mike,

Please let me know if you want to discuss this. I'm available today and tomorrow, but not Thursday or Friday.

Next week also works for me.

Thanks,

Tom Dow

VP Public Affairs

Carnival North America LLC
Washington, DC

From: Brake, Aubrie (CarnCorp)
Sent: Tuesday, July 26, 2016 4:22 PM
To: Rand, Michael P CIV (Michael.P.Rand@uscg.mil); samulski.michael@epa.gov; paul.topping@tc.gc.ca <mailto:paul.topping@tc.gc.ca>
Cc: Katsumi, Naomi (Naomi.Katsumi@tc.gc.ca); Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: Request for Carnival Liberty and Dream

Good Afternoon Captain Rand, Mr. Samulski, and Mr. Topping,

As discussed with Tom, attached is our request regarding the Carnival Liberty and Dream.

Please let us know if we can send you any additional information.

Thank you for your continued support.

Sincerely,

Aubrie Brake, Esq.

Manager - Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 7/28/2016 6:37:08 PM
To: Samulski, Michael [samulski.michael@epa.gov]
Subject: Re: Request for Carnival Liberty and Dream

Mike
Monday is fine. Pick a time and I can call you.
Thanks,

Tom

Sent from Tom Dow's Blackberry

From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Thursday, July 28, 2016 08:01 AM
To: Dow, Thomas (CarnCorp)
Cc: Mike Rand (michael.p.rand@uscg.mil) <michael.p.rand@uscg.mil>
Subject: RE: Request for Carnival Liberty and Dream

Tom,

I was out of the office earlier this week and just read the Carnival request this morning. I see that you are unavailable today and tomorrow. Maybe we can talk on Monday?

Thanks,

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Tuesday, July 26, 2016 4:31 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Subject: FW: Request for Carnival Liberty and Dream

Mike,
Please let me know if you want to discuss this. I'm available today and tomorrow, but not Thursday or Friday.
Next week also works for me.
Thanks,

Tom Dow
VP Public Affairs

Carnival North America LLC
Washington, DC

From: Brake, Aubrie (CarnCorp)
Sent: Tuesday, July 26, 2016 4:22 PM
To: Rand, Michael P CIV (Michael.P.Rand@uscg.mil); samulski.michael@epa.gov; paul.topping@tc.gc.ca
Cc: Katsumi, Naomi (Naomi.Katsumi@tc.gc.ca); Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: Request for Carnival Liberty and Dream

Good Afternoon Captain Rand, Mr. Samulski, and Mr. Topping,

As discussed with Tom, attached is our request regarding the Carnival Liberty and Dream.
Please let us know if we can send you any additional information.

Thank you for your continued support.
Sincerely,
Aubrie Brake, Esq.
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Sent: 8/30/2017 2:34:55 PM
To: Samulski, Michael [samulski.michael@epa.gov]
Subject: Automatic reply: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line - April 2017 Interim Report

I am away from my office until August 31, 2017. There may be some delay in responding to your e-mail.

Message

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 9/26/2016 7:27:51 PM
To: Samulski, Michael [samulski.michael@epa.gov]
CC: michael.P.Rand@uscg.mil; paul.topping@tc.gc.ca; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]; Brake, Aubrie (CarnCorp) [ABrake@carnival.com]; Carbonera, Daniele (CarnCorp) [DCarbonera@carnival.com]
Subject: RE: Carnival EGCS Engine Emissions Testing Plan proposal

Dear Mike;
Last week we reviewed a presentation from the testing consultants (UCRiverside) to explain adjustments in the analysis methods of their preliminary report from Crown Princess tests last November.
From that discussion there are a couple more things they have to check and we expect them to be ready to discuss again soon. We will then do a 3rd party review and hopefully be in position to send to you within October.

In the meantime we have continued the installation process, with 23 filters now installed across 12 of the previously Exempt ships.

We are also considering adding one or more testing consultants to accelerate this part of the agreement, and will keep you advised as we develop a new schedule proposal.
Best regards,
Mike

CAPT M.H. KACZMAREK
CARNIVAL CORPORATION & PLC
3655 NW 87 Avenue | Miami, FL 33178
Tel: (305) 406-5050
Mob: (305) 987-4605

From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Monday, September 26, 2016 11:04 AM
To: Kaczmarek, Michael (CarnCorp)
Cc: michael.P.Rand@uscg.mil; paul.topping@tc.gc.ca; Tombolesi, Emilio (CarnCorp); Brake, Aubrie (CarnCorp); Carbonera, Daniele (CarnCorp)
Subject: RE: Carnival EGCS Engine Emissions Testing Plan proposal

Mike,

It's been some time since we talked about the Carnival PM testing of ships equipped with scrubbers.

Can you provide me with an update of this testing? Do you have results that you can share?

Thanks,

Mike

****
Michael Samulski

U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

From: Kaczmarek, Michael (CarnCorp) [mailto:MKaczmarek@carnival.com]
Sent: Monday, October 05, 2015 7:01 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Cc: michael.P.Rand@uscg.mil; paul.topping@tc.gc.ca; Tombolesi, Emilio (CarnCorp) <ETombolesi@carnival.com>; Brake, Aubrie (CarnCorp) <ABrake@carnival.com>; Carbonera, Daniele (CarnCorp) <DCarbonera@carnival.com>
Subject: Carnival EGCS Engine Emissions Testing Plan proposal

Dear Mike, All;
Regret the delay, but attached please find our letter proposal for Engine Emissions Measurement as required by Article D.5. of the Exemption Permit (example attached).
Also attached is the spreadsheet showing the engine type distribution across the 31 Exempt ships.

Hopefully this proposal to use representative engines from each engine type will adequately meet the requirements, as each ship sampling is a substantial effort and cost.
The pace of the testing plan is necessarily linked to commissioning of both EGC and "dry filter" systems, which for the earlier ships are on separate installation schedules.

We understand that the Test Protocol is effectively agreed between your office and the UC Riverside test team; the first ship to be measured is CROWN PRINCESS, operating between Los Angeles and San Francisco from 10-12 October, 2015. The test team has already surveyed the ship during a port visit to San Diego on 24 September. They will also extend onboard as needed if not complete by the 12th. We will have representatives onboard as well to ensure ship coordination and testing goes smoothly.

Thanks, and best regards,
Mike Kaczmarek

Message

From: Carbonera, Daniele (CarnCorp) [DCarbonera@carnival.com]
Sent: 9/26/2016 3:05:05 PM
To: Samulski, Michael [samulski.michael@epa.gov]
Subject: Automatic reply: Carnival EGCS Engine Emissions Testing Plan proposal

Hello, I will be out of office Ex. 6 Personal Privacy (PP) , I will be back in office next Wednesday 27th of September
I will be checking emails intermittantly and there may be a delay in responses.
Cell phone is always available for any urgent matters that need attention.

Thank you.

Daniele Carbonera
SR Manager DIESEL PLANTS Corporate Ship Refit
Carnival Corporation & plc
3655 NW 87 Avenue | Doral, FL 33178 | • (305) 406-4908 | • (954) 593-8986 | 7: (305) 406-5778 | •: Dcarbonera@carnival.com

www.carnivalcorp.com<http://www.carnivalcorp.com>

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 9/23/2016 7:59:49 PM
To: Marine-eca [Marine-eca@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line - Carnival Sunshine Final Report
Attachments: Carnival Sunshine_Final Report_Bahamas_Confidential.pdf; Carnival Sunshine_Final Report_Bahamas.pdf

To Whom It May Concern,
Hope this email finds you well.
Attached is the Final Report for the Carnival Sunshine regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(c). We have provided two versions of the Report, one with the confidential business information included and the other with all confidential information redacted.

Please let us know if we can provide you with any additional information.
Thank you for your continued support.
Sincerely,

Aubrie Brake
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Bahamas Maritime Authority – Final Report

Carnival Corporation: One (1) Ship Operated by Carnival Cruise Line

M/V Carnival Sunshine

Refs: MARPOL Annex VI, Regulation 3.2; Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(c)

1. The Company's experience:
General:
The Sunshine has three EGCSs that can operate individually and simultaneously. During any transit, with as many as three engines, the ship is able to operate the EGCSs and meet the Emission Control Area (ECA) requirements.

As with all Scheme B systems, the Sunshine system is conducting continuous monitoring of SOx emissions with an installed gas analyzer by Consilium. The ship also continuously monitors the quality of the washwater by analyzing data from pH, PAH, and turbidity instruments. This data is recorded continuously (every three minutes) into a Compliance Computer. The recorded data is matched with GMT time from the ship's master clock and ship's navigation GPS coordinates to create an accurate record of both routine operations and special events, such as alarms.

Lloyd's Register approved the EGCSs on behalf of the Bahamas flag administration on 28 July 2016.

2. Information provided in Interim Reports:
Each quarterly Interim Report included fuel sulphur levels and calculations depicting the year-to-date average sulphur content and a summary of the sulphur levels for that quarter.

The average sulphur content for 2014:

Section C(5) Requirement	GULF	S. ATLANTIC
	2.9000%	2.8000%
Sum of % Sulphur	Column Labels	
Row Labels	Gulf	South Atlantic
2014		
Sunshine	2.7339%	2.6673%

The average sulphur content for 2015:

Section C(5) Requirement	S. ATLANTIC
	2.8000%
Sum of % Sulphur	
Row Labels	South Atlantic
2015	
Sunshine	1.9800%

The average sulphur content for 2016:

Section C(5) Requirement	S. ATLANTIC 2.8000%
Sum of % Sulphur	
Row Labels	South Atlantic
2016	
Sunshine	1.7057%

5. Certification:
Based on information and belief formed after reasonable inquiry, the statements and information contained in this document are true, accurate, and complete.

Name: Capt. Emilio Tombolesi

Date: 23 September 2016

Title: Director Environmental Policy, Carnival Corporation

Signature:

Message

From: Samulski, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7ECF1AF23A134D2995FD354D03632D6C-SAMULSKI, MICHAEL]
Sent: 7/29/2019 5:53:12 PM
To: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
CC: Laroo, Chris [laroo.chris@epa.gov]; Valerie Chatterley Ex. 6 Personal Privacy (PP) Ex. 6 Personal Privacy (PP)
Subject: RE: ECA Exempt Ships Exhaust Gas Testing: submission #2

Thank you Mike. Just responding to let you know we received this email and the one with the MIRACLE test report.

We would, of course, be interested in further discussions on the test program.

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Director, Large Marine and Aviation Center
1 (734) 214-4532
samulski.michael@epa.gov
****

From: Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>
Sent: Monday, July 29, 2019 1:21 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Cc: Laroo, Chris <laroo.chris@epa.gov>; Valerie Chatterley Ex. 6 Personal Privacy (PP) Ex. 6 Personal Privacy (PP)
Subject: ECA Exempt Ships Exhaust Gas Testing: submission #2

Dear Mike and Chris;
Please find attached the cover letter and summary of the Test Reports for Carnival MAGIC and Carnival MIRACLE.
The Test Report for Carnival MAGIC is attached also, and due to size the Report for Carnival MIRACLE will follow separately.
Both of these tests were conducted by Wartsila Technical Services.

Next will be the two Test Reports conducted by IVL, the Swedish Technical Environmental Institute, conducted on HAL EURODAM and REGAL PRINCESS, which are undergoing our review and should be completed this week.

As we discussed before, after you have received and reviewed the next group we'd like to have a discussion about testing methods, and potentially leading to another trial this year with your attendance also.

Thanks and best regards,
Mike

CAPT M.H. KACZMAREK
CARNIVAL CORPORATION & PLC
3655 NW 87 Avenue | Miami, FL 33178
Tel: (305) 406-5050
Mob: (305) 987-4605

Appointment

From: Samulski, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7ECF1AF23A134D2995FD354D03632D6C-SAMULSKI, MICHAEL]
Sent: 1/31/2019 1:50:21 PM
To: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]

Subject: Accepted: EGCS exhaust gas testing
Location: Conf call

Start: 1/31/2019 9:00:00 PM
End: 1/31/2019 10:00:00 PM
Show Time As: Busy

Message

From: Samulski, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7ECF1AF23A134D2995FD354D03632D6C-SAMULSKI, MICHAEL]
Sent: 5/9/2018 4:17:54 PM
To: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
CC: Valerie Chatterley Ex. 6 Personal Privacy (PP) 2tomdow Ex. 6 Personal Privacy (PP); Laroo, Chris [laroo.chris@epa.gov]
Subject: RE: Carnival Corporation - Missing Final Reports

Looking at our schedules, I can offer the following times (Eastern) for the week of May 21:

Monday:13:00
Tuesday: 9:00, 13:00, or 14:00
Wednesday: any time between 9:00 and 14:00

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

-----Original Message-----
From: Kaczmarek, Michael (CarnCorp) [mailto:MKaczmarek@carnival.com]
Sent: Wednesday, May 09, 2018 12:02 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Cc: Valerie Chatterley Ex. 6 Personal Privacy (PP) 2tomdow Ex. 6 Personal Privacy (PP); Laroo, Chris <laroo.chris@epa.gov>
Subject: RE: Carnival Corporation - Missing Final Reports

Thanks Mike.
Sooner is usually better but as I'm traveling on Monday the week of 21 May is probably best.
Valerie can join from onboard Paradise during testing.
Let us know what day(s)/time is good for you and we'll adjust.
Mike

-----Original Message-----
From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Wednesday, May 09, 2018 10:48 AM
To: Kaczmarek, Michael (CarnCorp)
Cc: Valerie Chatterley Ex. 6 Personal Privacy (PP) Ex. 6 Personal Privacy (PP); 2tomdow Ex. 6 Personal Privacy (PP); Laroo, Chris
Subject: RE: Carnival Corporation - Missing Final Reports

Mike,

Thanks for the quick response. I'm also traveling the rest of this week, and Chris Laroo is travelling most of next week.

Would you be available the week after next for a call? If so, I will suggest some times the week of May 21. (Alternatively, we are available at either 11:00 or 15:00 Eastern, next Monday)

Best regards,

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

-----Original Message-----
From: Kaczmarek, Michael (CarnCorp) [mailto:MKaczmarek@carnival.com]

Sent: Wednesday, May 09, 2018 10:38 AM
To: Samulski, Michael <samulski.michael@epa.gov>
Cc: Valerie Chatterley Ex. 6 Personal Privacy (PP) Ex. 6 Personal Privacy (PP) Ex. 6 Personal Privacy (PP)
2tomdow Ex. 6 Personal Privacy (PP)
Subject: RE: Carnival Corporation - Missing Final Reports

Dear Mike;
Am headed to the airport but let me give you an initial response.

Frankly it's embarrassing but I do have at least 3 of the remaining final reports ready to go, and will have at least those to you within Friday.

For ship testing, we have continued to do testing, both for exempt and non-exempt, but now feel we have enough qualified testing companies to accelerate this.

So far completed:

Crown Princess	exempt	ISO 8178	July 2017
Costa Fascinosa	non-exempt	EPA Method 5	July 2017
AIDAperla	non-exempt	ISO 8178	Feb 2018

Planned:

Carnival Paradise	exempt	ISO 8178	21 May 18
Royal Princess	exempt	ISO 8178	June 18
Carnival Conquest	exempt	ISO 8178	June 18

We will be available for a call almost any time after next week, when Tom, Valerie and I all return from different travel.
For the non-exempt tests we are happy to share unofficially if you are interested.

Regards,
Mike

-----Original Message-----
From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Wednesday, May 09, 2018 9:53 AM
To: Kaczmarek, Michael (CarnCorp)
Subject: RE: Carnival Corporation - Missing Final Reports

Dear Mike,

I hope you are doing well. I am going through my records and realized that I am missing final reports for four of the ships in from the Reg 3 program:

Carnival Liberty
Carnival Dream
Queen Mary 2
Carnival Triumph

Can you send these to me?

Also, how is the PM test program going? Would you be available for a status update call sometime in the next couple of weeks?

Thanks,

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

-----Original Message-----
From: Kaczmarek, Michael (CarnCorp) [mailto:MKaczmarek@carnival.com]
Sent: Wednesday, August 30, 2017 3:39 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Cc: Brake, Aubrie (CarnCorp) <ABrake@carnival.com>; 2tomdow Ex. 6 Personal Privacy (PP) Tombolesi, Emilio (CarnCorp) <ETombolesi@carnival.com>; Mueller, John <mueller.john@epa.gov>
Subject: Re: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line - April 2017 Interim Report

Dear Mike;
Good to hear from you.
We have the first group of reports finished now and are preparing the second group.
Regret the delay but you'll start receiving these shortly.

Also note that we had an apparently successful exhaust gas testing on Crown Princess and are reviewing the final report now. You'll receive that shortly also, and if acceptable we'll move ahead with that program in September.

Best regards,
Mike

Sent from my iPhone

On Aug 30, 2017, at 10:34 AM, Samulski, Michael
<samulski.michael@epa.gov<mailto:samulski.michael@epa.gov>> wrote:

Aubrie and Mike,

I hope you are doing well. I am trying to update my records and realized that we are missing the final reports for the following 5 vessels:

Carnival Liberty
Carnival Dream
Queen Mary 2
Carnival Triumph
Royal Princess

Can you send (or resend) these reports to me?

Also, what is the status on the PM testing for the Star Princess, Carnival Paradise, Carnival Miracle, Crown Princess, Niew Amsterdam, Carnival Dream, and Royal Princess?

Best regards,

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov<mailto:samulski.michael@epa.gov>
****

From: Brake, Aubrie (CarnCorp) [mailto:ABrake@carnival.com]
Sent: Tuesday, April 18, 2017 4:31 PM
To: Marine-eca <Marine-eca@epa.gov<mailto:Marine-eca@epa.gov>>
Cc: Samulski, Michael <samulski.michael@epa.gov<mailto:samulski.michael@epa.gov>>; Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com<mailto:MKaczmarek@carnival.com>>;
2tomdow[Ex. 6 Personal Privacy (PP)]; Tombolesi, Emilio (CarnCorp)
<ETombolesi@carnival.com<mailto:ETombolesi@carnival.com>>
Subject: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line - April 2017 Interim Report

To Whom It May Concern,

Hope this email finds you well. Attached is the April 2017 Interim Report regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(b).

All ships have completed their Exemption periods; therefore, this is the last Interim Report. Final Reports for the last few ships will be submitted in the near future.

Please let us know if we can provide you with any additional information.

Thank you for your continued support.

Sincerely,
Aubrie Brake, Esq.
Manager - Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com<mailto:abrake@carnival.com>

Message

From: Samulski, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7ECF1AF23A134D2995FD354D03632D6C-SAMULSKI, MICHAEL]
Sent: 3/24/2017 5:10:48 PM
To: Davies, Darren [Darren.Davies@lr.org]; HQS-PF-fldr-ECA-Foreign [HQS-PF-fldr-ECA-Foreign@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]; MTES/MARPOL (Marpol) [marpol@lr.org]; Americas - NASE [americas.nase@lr.org]; DeBord, Steven [DeBord.Steven@epa.gov]
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Liberty, IMO 9278181

I wanted to let you know that Justin Greuel no longer works for EPA. Please add Steve DeBord, from our Certification Division, in his place on future emails of this sort.

Steve is copied on this email and his address is:

DeBord.Steven@epa.gov

Thanks,

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Thursday, March 23, 2017 8:58 AM
To: greuel.justin@epa.gov; Samulski, Michael <samulski.michael@epa.gov>; HQS-PF-fldr-ECA-Foreign <HQS-PF-fldr-ECA-Foreign@uscg.mil>; Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>; Santiesteban, Marilyn (CarnCorp) <MSantiesteban@carnival.com>; MTES/MARPOL (Marpol) <marpol@lr.org>; Americas - NASE <americas.nase@lr.org>
Subject: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Liberty, IMO 9278181

Dear Capt. Rand,

Please find attached letter and supporting documentation for your notification of EGCS installations on board *M/V Carnival Liberty, IMO 9278181*. Please could you acknowledge receipt of this notification.

If you need any further information for your records, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST
Specialist, Engineering
Engineering Systems & MARPOL Department
Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457
E **darren.davies@lr.org**

Lloyd's Register Marine & Offshore
Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.
Visit www.lr.org

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Message

From: Samulski, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7ECF1AF23A134D2995FD354D03632D6C-SAMULSKI, MICHAEL]
Sent: 1/26/2017 12:26:42 PM
To: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Subject: RE: Carnival Call-Update on EGCS Project

Tom,

That sounds good. I look forward to talking with you then.

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, January 25, 2017 4:43 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Cc: Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>; Bondi, Tandy (CarnCorp) <TBondi@carnival.com>
Subject: Carnival Call-Update on EGCS Project

Mike,
We propose next Thursday, Feb. 2nd at 1.30pm EST. Allow 60 minutes.

Please advise if this works for you and if you want to add anyone from your group. Mike Kaczmarek will send an invite and dial-in number.
Thanks,

Tom Dow
Carnival Corporation

Sent from Tom Dow's Blackberry

Appointment

From: Samulski, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7ECF1AF23A134D2995FD354D03632D6C-SAMULSKI, MICHAEL]
Sent: 1/20/2017 12:37:33 PM
To: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]

Subject: Accepted: EGCS
Location: Conf call

Start: 1/25/2017 6:00:00 PM
End: 1/25/2017 7:30:00 PM
Show Time As: Busy

Appointment

From: Samulski, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7ECF1AF23A134D2995FD354D03632D6C-SAMULSKI, MICHAEL]
Sent: 2/2/2017 3:54:02 PM
To: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]

Subject: Accepted: Dry filter installation and testing: update
Location: Conference call

Start: 2/2/2017 7:00:00 PM
End: 2/2/2017 8:00:00 PM
Show Time As: Busy

Appointment

From: Samulski, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7ECF1AF23A134D2995FD354D03632D6C-SAMULSKI, MICHAEL]
Sent: 8/1/2016 11:40:52 AM
To: Dow, Thomas (CarnCorp) [TDow@carnival.com]; Mike Rand (michael.p.rand@uscg.mil) [michael.p.rand@uscg.mil]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Mueller, John [mueller.john@epa.gov]

Subject: Call with EPA/USCG/Carnival
Attachments: Formal Request_Carnival Liberty and Dream.pdf; Exempt Ship summary.pdf
Location: Ex. 6 Personal Privacy (PP) 3, passcode Ex. 6 Personal Privacy (PP)

Start: 8/1/2016 3:00:00 PM
End: 8/1/2016 3:30:00 PM
Show Time As: Tentative

Formal Request_Carniva... Exempt Ship summary.pdf

Mike,
Please let me know if you want to discuss this. I'm available today and tomorrow, but not Thursday or Friday.
Next week also works for me.
Thanks,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

From: Brake, Aubrie (CarnCorp)
Sent: Tuesday, July 26, 2016 4:22 PM
To: Rand, Michael P CIV (Michael.P.Rand@uscg.mil); samulski.michael@epa.gov; paul.topping@tc.gc.ca
Cc: Katsumi, Naomi (Naomi.Katsumi@tc.gc.ca); Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: Request for Carnival Liberty and Dream

Good Afternoon Captain Rand, Mr. Samulski, and Mr. Topping,

As discussed with Tom, attached is our request regarding the Carnival Liberty and Dream.
Please let us know if we can send you any additional information.

Thank you for your continued support.
Sincerely,
Aubrie Brake, Esq.
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

-

Mike

****

Michael Samulski

U.S. Environmental Protection Agency

Office of Transportation and Air Quality

Director, Large Marine and Aircraft Center

1 (734) 214-4532

samulski.michael@epa.gov

****

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Tuesday, July 26, 2016 4:31 PM
To: Samulski, Michael <samulski.michael@epa.gov>
Subject: FW: Request for Carnival Liberty and Dream

Mike,

Please let me know if you want to discuss this. I'm available today and tomorrow, but not Thursday or Friday.

Next week also works for me.

Thanks,

Tom Dow

VP Public Affairs

Carnival North America LLC
Washington, DC

From: Brake, Aubrie (CarnCorp)
Sent: Tuesday, July 26, 2016 4:22 PM
To: Rand, Michael P CIV (Michael.P.Rand@uscg.mil); samulski.michael@epa.gov; paul.topping@tc.gc.ca <mailto:paul.topping@tc.gc.ca>
Cc: Katsumi, Naomi (Naomi.Katsumi@tc.gc.ca); Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: Request for Carnival Liberty and Dream

Good Afternoon Captain Rand, Mr. Samulski, and Mr. Topping,

As discussed with Tom, attached is our request regarding the Carnival Liberty and Dream.

Please let us know if we can send you any additional information.

Thank you for your continued support.

Sincerely,

Aubrie Brake, Esq.

Manager - Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Samulski, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7ECF1AF23A134D2995FD354D03632D6C-SAMULSKI, MICHAEL]
Sent: 8/30/2017 2:34:45 PM
To: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
CC: 2tomdow@gmail.com; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]; Mueller, John [mueller.john@epa.gov]
Subject: RE: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line - April 2017 Interim Report

Aubrie and Mike,

I hope you are doing well. I am trying to update my records and realized that we are missing the final reports for the following 5 vessels:

Carnival Liberty
Carnival Dream
Queen Mary 2
Carnival Triumph
Royal Princess

Can you send (or resend) these reports to me?

Also, what is the status on the PM testing for the Star Princess, Carnival Paradise, Carnival Miracle, Crown Princess, Niew Amsterdam, Carnival Dream, and Royal Princess?

Best regards,

Mike

****
Michael Samulski
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov
****

From: Brake, Aubrie (CarnCorp) [mailto:ABrake@carnival.com]
Sent: Tuesday, April 18, 2017 4:31 PM
To: Marine-eca <Marine-eca@epa.gov>
Cc: Samulski, Michael <samulski.michael@epa.gov>; Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>; 2tomdow@gmail.com; Tombolesi, Emilio (CarnCorp) <ETombolesi@carnival.com>
Subject: Carnival Corporation - Reporting on Behalf of Carnival Cruise Line - April 2017 Interim Report

To Whom It May Concern,
Hope this email finds you well. Attached is the April 2017 Interim Report regarding MARPOL Annex VI, Regulation 3.2 - Permit to Allow Trials for Ship Emission Reduction and Control Technology Research, Section E(1)(b).

All ships have completed their Exemption periods; therefore, this is the last Interim Report. Final Reports for the last few ships will be submitted in the near future.

Please let us know if we can provide you with any additional information.
Thank you for your continued support.

Sincerely,

Aubrie Brake, Esq.
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Timothy.M.Brown@uscg.mil [Timothy.M.Brown@uscg.mil]
on behalf of Brown, Timothy M CIV [Timothy.M.Brown@uscg.mil]
Sent: 11/6/2013 8:08:08 PM
To: Stout, Alan [stout.alan@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Allain, Ryan D CDR [Ryan.D.Allain@uscg.mil]
Subject: RE: Carnival Draft letter from USCG and EPA
Attachments: Draft letter from USG to Carnival 11 1 2013 - (CG Edit-Format)docx.docx

Alan,

Ex. 5 Deliberative Process (DP)

Thanks,
Tim

Tim Brown
U.S. Coast Guard Headquarters
Environmental Standards Division (CG-OES-3)
Phone: 202.372.2358 | Fax: 202.372.1928

-----Original Message-----
From: stout.alan@epa.gov [mailto:stout.alan@epa.gov]
Sent: Wednesday, November 06, 2013 12:33 PM
To: Brown, Timothy M CIV
Subject: RE: Carnival Draft letter from USCG and EPA

Tim,

Ex. 5 Deliberative Process (DP)

Alan

-----Original Message-----
From: Timothy.M.Brown@uscg.mil [mailto:Timothy.M.Brown@uscg.mil]
Sent: Friday, October 25, 2013 4:05 PM
To: Samulski, Michael; Bailey, Robert E CAPT; McAvoy, Kyle P CAPT
Cc: Lantz, Jeffrey G SES; Charmley, William; Stout, Alan; Fluke, Charles K LCDR; Zamperini, Michael B CDR; Allain, Ryan D CDR
Subject: RE: Carnival Draft letter from USCG and EPA

Thanks Mike,

Understood. We'll take another look at Carnival's edits as well, and be standing by for routing on our end.

Have a good weekend.
Tim

Tim Brown
U.S. Coast Guard Headquarters
Environmental Standards Division (CG-OES-3)
Phone: 202.372.2358 | Fax: 202.372.1928

-----Original Message-----
From: samulski.michael@epa.gov [mailto:samulski.michael@epa.gov]
Sent: Friday, October 25, 2013 3:59 PM
To: Bailey, Robert E CAPT; Brown, Timothy M CIV; McAvoy, Kyle P CAPT
Cc: Lantz, Jeffrey G SES; Charmley, William; Stout, Alan
Subject: FW: Carnival Draft letter from USCG and EPA

Here is the response we got back from Carnival.

Ex. 5 Deliberative Process (DP)

will be in touch.

Thanks,

Mike

****

Michael Samulski

U.S. Environmental Protection Agency

Office of Transportation and Air Quality

Director, Large Marine and Aircraft Center

1 (734) 214-4532

samulski.michael@epa.gov

****

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Thursday, October 24, 2013 2:15 PM
To: Samulski, Michael; Charmley, William
Cc: Kaczmarek, Michael (CarnCorp)
Subject: Carnival Draft letter from USCG and EPA

Mike

Carnival has no concerns with the draft letter.

The attached Word document includes the current ship schedule in Attachment 1. The PDF shows Attachment 1 in the format previously provided to USCG and EPA.

The Exemption Request Template is the same one you sent yesterday.

The EPA/USCG letter in July prompted R&D scheduling activity as well as focus by itinerary planners to keep ships within or bring ships back to the NA ECA. The revised ship list reduces 2016 installations from 7 ships to 3 ships. The list includes 26 of the original 32 ships, with 6 ships changed to reflect itinerary, drydock or wet dock schedule changes. We will continue to look for ways to accelerate installation.

Please proceed with processing for signature, and provide a copy to me when you send it electronically.

Thanks and regards,

Tom Dow

Vice President, Public Affairs

Carnival North America LLC

Washington, DC

From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Wednesday, October 23, 2013 10:13 PM
To: Dow, Thomas (CarnCorp)
Cc: Charmley, William
Subject: Draft letter from USCG and EPA

Tom,

We and USCG have completed the draft letter on the trial program. However, prior to finalizing the letter, I wanted to share it with you to see if you have any feedback. The draft letter is attached.

If this raises no concerns, we will start processing it for signature.

Best regards,

Mike

****

Michael Samulski

U.S. Environmental Protection Agency

Office of Transportation and Air Quality

Director, Large Marine and Aircraft Center

1 (734) 214-4532

samulski.michael@epa.gov

****

U.S. Department of Homeland Security
United States Coast Guard

Commandant
U.S. Coast Guard

2703 Martin Luther King Ave S.E., Stop 7501
Washington, DC 20593-7501
Staff Symbol: CG-5PC
Phone: (202) 372-1018
Fax: (202) 372-1910

Formatted Table

Mr. Michael Kaczmarek
Vice President, Shipbuilding
Carnival Corporation & plc
3655 NW 87th Avenue
Miami, FL 33178

Dear Mr. Kaczmarek:

This letter is in response to the request made by Carnival Corporation & plc (Carnival) seeking the views of the United States Coast Guard (USCG), United States Environmental Protection Agency (EPA) regarding Carnival's plans for obtaining approval from its flag states of an exemption to conduct trials for the development of ship emission reduction and control technologies under IMO's Annex VI, Regulation 3 for certain Carnival ships flagged by the Netherlands, Panama, Bermuda, and the Bahamas. Under its proposed program, Carnival plans to install exhaust gas cleaning systems for engines on vessels that operate in the North American and U.S. Caribbean Emission Control Areas ("ECAs").

Coast Guard and EPA's cooperative discussions with Carnival over the past several months have resulted in the development of a feasible approach for exhaust gas cleaning system trial programs under MARPOL Annex VI, Regulation 3 for up to 32 vessels. Under these trial programs, Carnival would install sufficient exhaust gas cleaning capacity on each of the ships to meet or exceed the 2015 ECA fuel sulfur requirements. Attachment 1 identifies the anticipated vessels with the corresponding flag state and projected installation dates. We note that Attachment 1 reflects some changes in the projected installation dates since the August 8, 2013 letter was sent from USCG and EPA to Carnival on the general concept. Some of the vessels originally planned for exhaust gas scrubber installation in 2016 have been rescheduled for 2014Some of the vessels originally planned for installation in 2014 have been pushed back to 2016.

USCG and EPA have reviewed the elements of the proposed trial programs for those vessels operating in the ECAs. Under these trial programs, Carnival would seek a permit from the relevant flag state for an exemption for each of the vessels identified in Attachment 1 from the fuel sulfur requirements of MARPOL Annex VI, Regulation 14 until 60 days after the installation of the exhaust gas cleaning units for each respective vessel. For vessels with installation dates prior to January 1, 2016, the exemption period shall begin upon approval of the trial program by the flag state. For vessels with installation dates in 2016, the exemption period shall begin on January 1, 2015. Attachment 2 provides the details of the trial program for each affected vessel, excepting the individual ship names, flag states, and installation dates.

We acknowledge that Carnival may choose to modify the selected vessels and installation dates included in Attachment 1 in its request to the flag state and the permitted vessels still meet the requirements for a Regulation 3 trial program exemption, provided that the following conditions are met: 1) no more than

32 vessels may be exempted under these trial programs, 2) no more than 7 vessels may be exempted with installation dates from January 1 through June 30, 2016, 3) no vessels may be exempted with installation dates after June 30, 2016, 4) any substitution of vessels must maintain a comparable diversity of engine types and vessel classes as presented in Attachment 1, and 5) Carnival informs USCG and EPA of any such modifications. As part of this effort, it is expected that Carnival will provide USCG and EPA copies of each trial program permit approved by the flag states.

We acknowledge, subject to approval by Carnival's flag states, that the proposed trial programs, if fully implemented according to the stated terms in Attachment 2, meet the provisions of MARPOL Annex VI, Regulation 3. USCG and EPA also agree that a vessel meeting all the terms and conditions of the permit issued under the trial program is exempt from the Annex VI Regulation 14 fuel sulfur requirements during the specified period for such exemption.

U.S. Government acceptance of an exemption under the MARPOL Annex VI, Regulation 3 as proposed by Carnival does not affect U.S. Port State rights, authorities and responsibilities under MARPOL Annex VI, or applicable law.

Sincerely,

Jonathan C. Burton, Captain
Director of Inspections and Compliance
U.S. Coast Guard

Christopher Grundler
Director, Office of Transportation and Air Quality
U.S. Environmental Protection Agency

Cc:
Stephen Keenan, Bahamas Maritime Authority
Captain Pat Nawaratne, Bermuda Department of Maritime Administration
Bart de Jong, Netherlands Ministry of Infrastructure and Environment
Dick Brus, Netherlands Ministry of Infrastructure and Environment
Eng. Jose Louis Ortega, Maritime Authority of Panama
Gerard McDonald, Transport Canada
Ambassador Odile Roussel, Permanent Representative of France to IMO

DRAFT—DO NOT CITE OR QUOTE

Attachment 1

Vessel	Flag State	Projected Installation Start Dates as of 4 Oct 2013
Golden Princess	Bermuda	24 Sep 2014
Carnival Pride	Panama	19 Oct 2014
ms Volendam	Netherlands	8 Dec 2014
Star Princess	Bermuda	9 Dec 2014
Carnival Paradise	Panama	14 Dec 2014
Carnival Magic	Panama	8 Feb 2015
Carnival Miracle	Panama	7 Mar 2015
ms Nieuw Amsterdam	Netherlands	29 Mar 2015
ms Zuiderdam	Netherlands	30 Mar 2015
ms Zaandam	Netherlands	19 Apr 2015
ms Amsterdam	Netherlands	30 Apr 2015
Crown Princess	Bermuda	2 May 2015
Carnival Fascination	Bahamas	9 May 2015
Carnival Dream	Panama	1 Sep 2015
ms Noordam	Netherlands	15 Sep 2015
Carnival Breeze	Panama	15 Sep 2015
Carnival Glory	Panama	1 Oct 2015
Carnival Fantasy	Panama	17 Oct 2015
Ruby Princess	Bermuda	3 Nov 2015
Queen Mary 2	Bermuda	5 Nov 2015
ms Statendam	Netherlands	30 Nov 2015
Carnival Conquest	Panama	1 Dec 2015
ms Eurodam	Netherlands	1 Dec 2015
Carnival Valor	Panama	2 Dec 2015
Emerald Princess	Bermuda	2 Dec 2015
Royal Princess	Bermuda	6 Dec 2015
Coral Princess	Bermuda	9 Dec 2015
Carnival Sunshine	Bahamas	9 Dec 2015
Carnival Triumph	Bahamas	9 Dec 2015
Carnival Splendor	Panama	7 Mar 2016
ms Oosterdam	Netherlands	30 Mar 2016
Carnival Liberty	Panama	1 Apr 2016

Attachment 2

[Attach permit template]

Message

From: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
Sent: 10/2/2015 11:17:43 AM
To: Samulski, Michael [samulski.michael@epa.gov]
Subject: RE: Formal Request - M/V Noordam and M/V Queen Mary 2
Attachments: 2015 10 02 ltr to Carnival addressing QUEEN MARY 2 permit changes.docx

Mike:

Here is the proposed letter. Please review/advise. Once you are good with it I will forward for signature.

r/Mike

-----Original Message-----
From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Thursday, October 01, 2015 3:24 PM
To: Rand, Michael P CIV
Subject: FW: Formal Request - M/V Noordam and M/V Queen Mary 2

Mike,

I just got confirmation from my management that we can support this. Given that this request is within the terms of the letter USCG sent Carnival earlier this year, we are fine with a letter from USCG approving this request.

Mike

****

Michael Samulski

U.S. Environmental Protection Agency

Office of Transportation and Air Quality

Director, Large Marine and Aircraft Center

1 (734) 214-4532

samulski.michael@epa.gov

****

From: Brake, Aubrie (CarnCorp) [mailto:ABrake@carnival.com]
Sent: Monday, September 21, 2015 3:21 PM
To: Samulski, Michael; Rand, Michael P CIV (Michael.P.Rand@uscg.mil); paul.topping@tc.gc.ca
Cc: Kaczmarek, Michael (CarnCorp); tdow@carnival.com; Tombolesi, Emilio (CarnCorp)
Subject: RE: Formal Request - M/V Noordam and M/V Queen Mary 2

Good Afternoon Captain Rand, Mr. Samulski, and Mr. Topping,

Hope this email finds you all well.

Just wanted to follow up on our request regarding Holland America Line's Noordam and Cunard Line's Queen Mary 2.

Please let us know if we can provide you with any additional information.

Thank you for your continued support.

Sincerely,

Aubrie Brake

Manager - Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com <mailto:abrake@carnival.com>

From: Brake, Aubrie (CarnCorp)
Sent: Thursday, September 03, 2015 7:30 PM
To: samulski.michael@epa.gov; Rand, Michael P CIV (Michael.P.Rand@uscg.mil); paul.topping@tc.gc.ca
Cc: Kaczmarek, Michael (CarnCorp) (MKaczmarek@carnival.com); Dow, Thomas (CarnCorp) (TDow@carnival.com); Tombolesi, Emilio (CarnCorp)
Subject: Formal Request - M/V Noordam and M/V Queen Mary 2

Good Evening Captain Rand, Mr. Samulski, and Mr. Topping,

Hope this email finds you well.

As per our prior communication, attached is the formal request regarding Holland America Line's Noordam and Cunard Line's Queen Mary 2.

Please let us know if we can provide you with any additional information.

Sincerely,

Aubrie Brake

Manager - Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

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United States Coast Guard

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Washington, DC 20593-7501
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Phone: (202) 372-1435
Fax: (202) 372-8372
Email: Michael.P.Rand@uscg.mil

16721

Mr. Michael Kaczmarek
Vice President, Shipbuilding
Carnival Corporation & plc
3655 NW 87th Avenue
Miami, FL 33178

Dear Mr. Kaczmarek:

The Coast Guard and the Environmental Protection Agency have approved Carnival's request to transfer the unused days of the NOORDAM's MARPOL Annex VI Regulation 3 permit to the QUEEN MARY 2, as requested in your letter dated 3 September 2015.

This extension is consistent with our letters of 12 November 2013 and 13 April 2015. This one-to-one offset extends the QUEEN MARY 2's permit from 14 January 2016 until 8 May 2016. All other provisions of the permit remain in effect.

A copy of this letter should be attached to the QUEEN MARY 2's permit onboard the ship.

Please contact Mr. Mike Rand by telephone at (202) 372-1435 or by email at [HYPERLINK "mailto:Michael.P.Rand@uscg.mil"] if you have additional questions or concerns regarding this matter.

Sincerely,

K.P. McAvoy
Captain, U.S. Coast Guard
Chief, Office of Commercial
Vessel Compliance

Message

From: Rand, Michael P CIV [Michael.P.Rand@uscg.mil]
Sent: 2/10/2016 12:42:40 PM
To: Samulski, Michael [samulski.michael@epa.gov]; Revelt, Jean-Marie [revelt.jean-marie@epa.gov]
Subject: RE: Request for ECA Exemption Timing Revisions
Attachments: 2016 02 10 ltr to Carnival addressing SPLENDOR and DREAM permit change.docx

Good morning:

I believe we have discussed this in the past. Please see the attached draft response. Let me know if this is ok.

Thanks.

r/Mike

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Monday, February 08, 2016 4:56 PM
To: Michael Samulski (Samulski.Michael@epamail.epa.gov); Rand, Michael P CIV; paul.topping@tc.gc.ca
Cc: Kaczmarek, Michael (CarnCorp); Brake, Aubrie (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: [Non-DoD Source] FW: Request for ECA Exemption Timing Revisions

All,

Checking on progress before the next snow storm hits Washington.

Thanks for considering this request.

Regards,

Tom Dow

VP Public Affairs

Carnival North America LLC

Washington, DC

From: Dow, Thomas (CarnCorp)
Sent: Thursday, January 28, 2016 2:40 PM
To: Michael Samulski (Samulski.Michael@epamail.epa.gov); Rand, Michael P CIV (Michael.P.Rand@uscg.mil); paul.topping@tc.gc.ca
Cc: Kaczmarek, Michael (CarnCorp); Brake, Aubrie (CarnCorp); Tombolesi, Emilio (CarnCorp)
Subject: FW: Request for ECA Exemption Timing Revisions

All,

Following up on the email below, since some of us were snowed-out earlier in the week.

I don't expect sympathy from Paul or Mike Samulski, but things pretty much close down with 24 inches here in DC.

Hope all are well and looking forward to your consideration of this request.

Regards,

Tom Dow

VP Public Affairs

Carnival North America LLC

Washington, DC

From: Dow, Thomas (CarnCorp)
Sent: Sunday, January 24, 2016 12:55 PM
To: Michael Samulski (Samulski.Michael@epamail.epa.gov); Rand, Michael P CIV (Michael.P.Rand@uscg.mil); paul.topping@tc.gc.ca
Cc: Kaczmarek, Michael (CarnCorp); Tombolesi, Emilio (CarnCorp); Brake, Aubrie (CarnCorp); Evans, Eric (CarnCorp)
Subject: Request for ECA Exemption Timing Revisions

Mike, Captain Rand, and Paul,

Attached is a request for an extension of time for the Exemption installation period for Carnival Dream. This is offset by an equal reduction in the installation period for Carnival Splendor.

This request is due to two factors:

1. Carnival plans to redeploy Splendor.

2. Carnival Dream will require additional time for the Exhaust Gas Cleaning System installation.

Paul, please note that neither ship operates in Canadian waters.

Please advise if you wish to discuss this further and we will arrange a conference call.

Thank you for considering this request.

Regards,

Tom Dow

VP Public Affairs

Carnival North America LLC

Washington, DC

U.S. Department of Homeland Security

United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. S.E.
Washington, DC 20593-7501
Staff Symbol: CG-CVC-1
Phone: (202) 372-1435
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Email: Michael.P.Rand@uscg.mil

16721

Mr. Michael Kaczmarek
Vice President, Shipbuilding
Carnival Corporation & plc
3655 NW 87th Avenue
Miami, FL 33178

Dear Mr. Kaczmarek:

The Coast Guard and the Environmental Protection Agency have approved Carnival's request to transfer 173 days of emission control area (ECA) permit from the CARNIVAL SPLENDOR to the CARNIVAL DREAM, as requested in your letter dated 22 January 2016.

This extension is consistent with our letter of 12 November 2013. Further, and as agreed to by Carnival, future delays to other vessels covered by our letter of 12 November 2013 will be subject to a one-to-one offset; meaning for each month a vessel completion is delayed, another vessel will be accelerated one month or a vessel will lose one month of its exemption to burn fuel with a sulfur content exceeding 0.10%. All other provisions of the permit remain in effect.

Please contact Mr. Mike Rand by telephone at (202) 372-1435 or by email at [HYPERLINK "mailto:Michael.P.Rand@uscg.mil"] if you have additional questions or concerns regarding this matter.

Sincerely,

K. P. McAvoy
Captain, U.S. Coast Guard
Chief, Office of Commercial
Vessel Compliance

Message

From: Samulski, Michael [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7ECF1AF23A134D2995FD354D03632D6C-SAMULSKI, MICHAEL]
Sent: 7/21/2016 2:21:14 PM
To: Greuel, Justin [Greuel.Justin@epa.gov]; Mueller, John [mueller.john@epa.gov]
Subject: FW: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Valor IMO 9236389
Attachments: EGC System MV Carnival Valor ETM-B - Rev. 21st Jun 2016 - LR Approved.pdf

-----Original Message-----
From: Mitchell, Alastair (CarnCorp) [mailto:AMitchell@carnival.com]
Sent: Thursday, July 21, 2016 10:08 AM
To: Rand, Michael P CIV <Michael.P.Rand@uscg.mil>; Davies, Darren <Darren.Davies@lr.org>
Cc: Greuel, Justin <Greuel.Justin@epa.gov>; Samulski, Michael <samulski.michael@epa.gov>; HQS-PF-fldr-ECA-Foreign <HQS-PF-fldr-ECA-Foreign@uscg.mil>; Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>; Millman, Chris (CarnCorp) <CMillman@carnival.com>; Kanzleiter, Ross (CCL) <RKanzleiter@carnival.com>; Santiesteban, Marilyn (CarnCorp) <MSantiesteban@carnival.com>; MTES/MARPOL (Marpol) <marpol@lr.org>; Miami <Miami@lr.org>; Mavin, Elizabeth <elizabeth.mavin@lr.org>; Siddiqui, Nouman <Nouman.Siddiqui@lr.org>
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Valor IMO 9236389

Good Afternoon Capt. Rand,

Apologies for jumping in however I am aware that Darren is going on leave and I am not sure if he has already gone.

Please find attached the LR copy of the ETM-B for Carnival Valor as requested.

Kind Regards,

Ali

Ali Mitchell

Carnival Corporation & PLC
Naval Architect & Project Engineer
Tel (Mobile): +44 (0) 78 5551 5387

-----Original Message-----
From: Rand, Michael P CIV [mailto:Michael.P.Rand@uscg.mil]
Sent: Thursday, July 21, 2016 1:17 PM
To: Davies, Darren
Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Kanzleiter, Ross (CCL); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Miami; Mavin, Elizabeth; Siddiqui, Nouman
Subject: RE: USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Valor IMO 9236389

Dear Mr. Davies:

Thank you for submitting the documentation for the exhaust gas cleaning systems for the M/V CARNIVAL VALOR.

Please provide a copy of the ETM-B for the vessel.

I will contact you if I have questions.

r/Mike Rand

-----Original Message-----
From: Davies, Darren [mailto:Darren.Davies@lr.org]
Sent: Wednesday, July 20, 2016 12:18 PM
To: Rand, Michael P CIV

Cc: greuel.justin@epa.gov; samulski.michael@epa.gov; HQS-PF-fldr-ECA-Foreign; Kaczmarek, Michael (CarnCorp); Millman, Chris (CarnCorp); Mitchell, Alastair (CarnCorp); Kanzleiter, Ross (CCL); Santiesteban, Marilyn (CarnCorp); MTES/MARPOL (Marpol); Miami; Mavin, Elizabeth; Siddiqui, Nouman
Subject: [Non-DoD Source] USCG/US EPA Review of Proposal for IMO Certification of Exhaust Gas Cleaning System (EGCS) for MV Carnival Valor IMO 9236389

Dear Capt. Rand,

Please find attached supporting documentation for your notification of EGCS installed on M/V Carnival Valor, IMO 9236389. Please could you acknowledge receipt of this notification.

Of note, I have included the Interim Certificate for this vessel contained within the supporting documentation, which references the LR EGCS checklist items, Part 1 BA 050, and Part 2 CA. The attending surveyor noticed some issues that require resolving associated to the Classification installations, however, no restrictions on the running of the EGCS equipment concerned have been imposed. I can confirm that we (Lloyd's Register) have received the revised documentation for review from Carnival Corporation, and are currently processing the documents.

If you need any further information, please do not hesitate to ask.

Kind Regards,

Darren Davies, IEng, IMarEng, MIMarEST

Specialist, Engineering

Engineering Systems

Southampton Technical Support Office (TSO)

Lloyd's Register Global Technology Centre

T +44 (0) 330 4140 457

E darren.davies@lr.org <mailto:darren.davies@lr.org>

Lloyd's Register Marine & Offshore

Lloyd's Register Global Technology Centre, Southampton Boldrewood Innovation Campus, Burgess Road, Southampton, SO16 7QF, UK.

Visit www.lr.org <https://urldefense.proofpoint.com/v2/url?u=http-3A__www.lr.org_&d=CwMFAg&c=0NKfg44GVknAU-XkWXjNxQ&r=XSzlajm_6EsKwgcWGMSe4pfAKjZrPZahxVyFZ766Os8&m=a2g0pnbgHpWbmqXOBetWFdXVSNT5Qyhb68xSJl5XhaY&s=Q2B-oioGtsLWeOlyFxHGl6yIPJjgxu-dMemzRR5bR60&e=>

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This document **must be carried on board at all times** and be available for inspection by the Classification Society and Authorities.

ECOSPRAY TECHNOLOGIES

Ecospray Service

Email: **service@ecospray.eu**
(Active 24/7)

Telephone: **+39 0131 854021**
(Active 9am to 5pm CET – Mon to Fri)

Exhaust Gas Cleaning System
Technical Manual – Scheme B

Open-Loop Seawater DeSOx Absorption System 'ECO-DeSOx™' for MV Carnival Valor

This Technical Manual describes the Exhaust Gas Cleaning System Scheme B (ETM-B). It has been developed in accordance with the requirements given in the 2015 Guidelines for Exhaust Gas Cleaning Systems – MEPC-259(68) Section 5.6.1

Purchase Order number:	**1090188**
Job number:	**2015_071_APC**
Ship name:	**MV Carnival Valor**
IMO number:	**9236389**
System manufactured by:	**Ecospray Technologies S.r.l., Alzano Scrivia, Alessandria, Italy**
Unit model:	**ECO-DeSOx**
Ecospray project number:	**15_071_APC**

An EGC System is fitted for SOx emission control purposes to each of the DGs listed below, and each DG has a designated DeSOx Tower:

Diesel Generator number:	4	5	6
Location in ship:	**Aft Engine Rm**	**Aft Engine Rm**	**Aft Engine Rm**
Engine:	**Wartsila 16ZAV40S**	**Wartsila 12ZAV40S**	**Wartsila 16ZAV40S**
MCR:	**11,520kW**	**7,920kW**	**11,520kW**
Speed:	**514 rpm**	**514 rpm**	**514 rpm**
Cycle:	**4-stroke**	**4-stroke**	**4-stroke**
DG Serial number:	**12424**	**12428**	**12425**
EGC Tower number:	**15-071-APC-SC-0400**	**15-071-APC-SC-0500**	**15-071-APC-SC-0600**

Approved in accordance with regulation 4 of MARPOL Annex VI as an equivalent means of achieving compliance with regulation 14 of that Annex.

If amendments are necessary to the contents of this Manual, either as replacement or additional pages, these are to be approved by the Administration before implementation.

Client:	**Carnival Cruise Lines**
Revision:	**21 June 2016**

Prepared by	Checked by	Approved by
Paolo Feltri		
Paolo Feltri	**Fabio Calcagno**	**Maurizio Archetti**

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A TID7952 – Scrubber wash water pH modelling – CCL Freedom – 14 May 2015

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Glossary

A_T	Ocean Alkalinity
DG	Diesel Generator
ECA	Emission Control Area
EGC	Exhaust Gas Cleaning
FNU/NTU	Formazin Nephelometric Units/Nephelometric Turbidity Units
HFO	Heavy Fuel Oil
IAMCS	Integrated Automation Monitoring Control System
IMO	International Maritime Organization
kW	Kilowatt
MCR	Maximum Continuous Rating
MV	Motor Vessel
MW	Megawatt
P&ID	Piping and Instrument Diagram
PAH	Polycyclic Aromatic Hydrocarbons
pH	Measure of the acidity of an aqueous solution
PLC	Programmable Logic Controller
ppb/ppm	Parts per Billion/Parts per Million
rpm	Revolutions Per Minute
SW	Seawater
VDU	Visual Display Unit
XX XX	Refer to P&ID

1 Main Data

The Ecospray EGC Systems installed on board this vessel are One-Stage Exhaust Gas Cleaning Systems. The main purpose of this Manual is to provide Operators with sufficient information to comply with the requirements of MEPC 259(68).

	DG#4	DG#5	DG#6
Fuel oil combustion unit(s)			
Combustion cycle	4-stroke	4-stroke	4-stroke
Type	Wartsila 16ZAV40S	Wartsila 12ZAV40S	Wartsila 16ZAV40S
Rated power [kW]	11,520	7,920	11,520
Exhaust gas flow rate [kg/h] at full load (100% MCR)	76,836	59,818	76,836
Max exhaust gas backpressure on DG [hPa]	40	40	40
EGC unit(s)			
Manufacturer	Ecospray Technologies S.r.l., Alzano Scrivia		
EGC Tower model	ECO-DeSOx	ECO-DeSOx	ECO-DeSOx
EGC Tower number	15-071-APC-SC-0400	15-071-APC-SC-0500	15-071-APC-SC-0600

Table 1. EGC System Main Data

2 General

2.1 DeSOx Tower

The DeSOx Tower is a Wet Open-loop Type Absorbing System that utilizes the natural alkalinity contained in seawater to turn SOx into neutral carbonate salts. The absorption process takes place inside the DeSOx Tower which has been installed in place of the silencer.

The DeSOx Tower is designed to achieve an SO_2/CO_2 ratio of 4.3 (equivalent to the use of 0.10% sulphur content fuel oil) or less when the engine load is 85% MCR and the ship is using 3.5% m/m sulphur content HFO and is operating in areas where the seawater alkalinity content is = 1300 µmol kg^{-1}.

Seawater is continuously supplied to the DeSOx Tower by the variable speed SW Pumps. When the system is in its standard automatic control mode the Automation System automatically sets the required seawater flow rate based on the DG load and calculated SO_2/CO_2 ratio. Values for SO_2 and CO_2 are taken from the Exhaust Gas Analyzer readings. For each installation, a Minimum and Maximum flow rate value is set during commissioning of the EGC System. This Automation System not only maintains the SO_2/CO_2 ratio as required at all engine loads (including transient loads), but also maintains both the pH and PAH values within the required IMO MARPOL limits.

Downstream of the SW Pumps, fully Automated Seawater Filters are installed. The Filters automatically go into back-washing mode when the differential pressure across them exceeds 0.3 barg. In addition, a back-wash timing cycle independent of the differential pressure can be set by the Operator at the Ecospray PLC Setting Page; the interval can be adjusted as needed for environmental conditions or in the event of a failure of the differential pressure function.

Note: When the filter is in back-washing mode, the flow of wash-water to the DeSOx Tower is not affected and thus the EGC System will maintain compliance throughout the back-washing cycle.

The DeSOx Towers are fitted with nozzle banks which spray seawater into the exhaust gas stream.

A Static Demister is fitted at the top of each DeSOx Tower to remove water droplets and mist to avoid carry-over. The water removed by the Demister is drained back to the main body of the Towers by gravity.

Differential pressure across the Demister is measured in order to monitor the pressure drop.

In the dry condition no SW is pumped into the DeSOx Tower and the Tower operates as a silencer only. The DeSOx Tower is designed to withstand dry hot conditions for extended periods. When in the dry hot condition, and when the ship is sailing within Emission Control Areas (ECAs or EU Ports), the engine shall burn a fuel oil in compliance with the regulations.

2.2 Wash-water System

a. Wash-water is drained from the DeSOx Tower by gravity

b. Wash-water monitoring for PAH and Turbidity compares the values after the DeSOx Tower to the DeSOx Tower inlet values in order to derive the difference between outlet and inlet readings (ΔPAH and ΔTurbidity)

c. Wash-water is mixed in the Static Mixer with additional SW to control the pH of water discharged overboard

d. No additional water treatment is applied

Design Requirements of Wash-water System

The pH of the water discharged overboard is controlled and managed by mixing SW (the pH of which corresponds to that of the local SW) and the low pH water discharged from the DeSOx Tower. Therefore the only component of wash-water treatment is the Static Mixer unit. This Static Mixer is fitted with internal baffles to ensure the complete mixing of the two input streams thereby resulting in a homogenous outlet stream.

Regulatory Requirements of Wash-water System

The Ecospray EGC System is designed to fulfil the wash-water discharge requirements detailed in the IMO Resolution MEPC 259(68) and US EPA Vessels General Permit (VGP), as a minimum:

*Wash-water SW PAHphe at DeSOx Tower discharge	ΔPAHphe < 50 µg/L or less at 45 t SW/MWh
**Wash-water SW Turbidity at DeSOx Tower discharge	ΔTurbidity <25 FNU or NTU
Wash-water SW pH at the overboard discharge	***IMO – not less than 4.0 at overboard
	US EPA – not less than 6.0 at overboard
****Wash-water Nitrates at the overboard discharge	The nitrates limit ($c(NO_3)$) is to be calculated each time a sample is taken, see note

* Limit Value of 50 µg/l (equivalent to 50 ppb) in concentration limit between the Sea Suction (Rack1) and the DeSOx Outlet (Rack 2) is normalized for wash-water flow through the DeSOx Tower of 45 tonnes/MWh where the MW refers to the MCR of the DG. The limit therefore varies according to the wash-water flow rate and can be calculated at any operating point using the following formula:

$$\text{PAHphe Limit } (\mu g/L) = 2250 \times \frac{\text{Engine MCR (MW)}}{\text{Actual SW flow rate } (m^3/h) \times \text{Density SW } (t/m^3)}$$

Density of SW is to be taken as 1.025 t/m³

For a 15-minute period in any 12-hour period, the continuous PAHphe concentration may exceed the limit described above by up to 100%. This allows for an abnormal start up of the EGC unit.

** The maximum continuous turbidity in the wash-water at the DeSOx Outlet (Rack 2) should not be greater than 25 FNU/NTU above the turbidity at the Sea Suction (Rack1). The regulations require that these inlet/outlet difference readings are taken as a rolling average over a 15-minute period. This EGC System does not use average readings to calculate the inlet/outlet difference, instead it uses direct values, which results in a stricter limit than is required by the regulations.

For a 15-minute period in any 12-hour period, the continuous turbidity discharge limit may be exceeded by 20%.

*** The pH overboard discharge limit value was determined by using calculation-based methodology in compliance with paragraph 10.1.2.1.2 of the MEPC.259(68).

The overboard discharge pH limit of 4.0 has been determined as corresponding to a pH of not less than 6.5 at 4 metres from the ship's side as defined in the reference document 'TID7952 - Scrubber wash water pH modelling - CCL Freedom - 14 May 2015'.

The limit is related to the overboard discharge outlets on this vessel with a circular outlet of 400mm diameter.

Note: When the ship operates within US waters where VGP applies, the overboard discharge pH limit is 6.0 or above.

**** The wash-water treatment system should prevent the discharge of nitrates beyond that associated with a 12% removal of NOx from the exhaust, or beyond 60 mg/l normalized for a wash-water discharge rate of 45 t / MWh, whichever is greater.

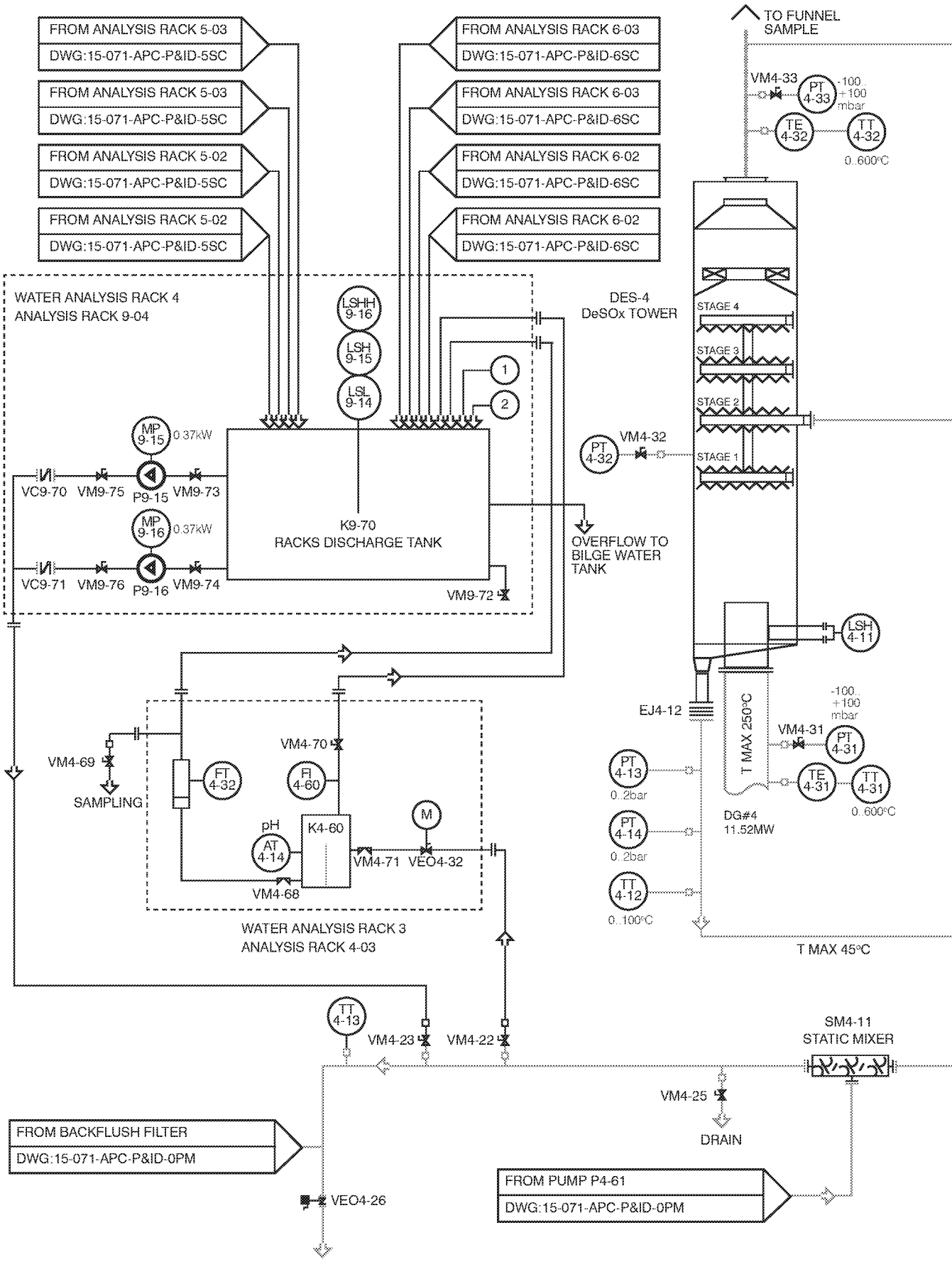
The nitrate limit is to be calculated at the time of sampling based on engine load and wash-water flow rate, using the following formula:

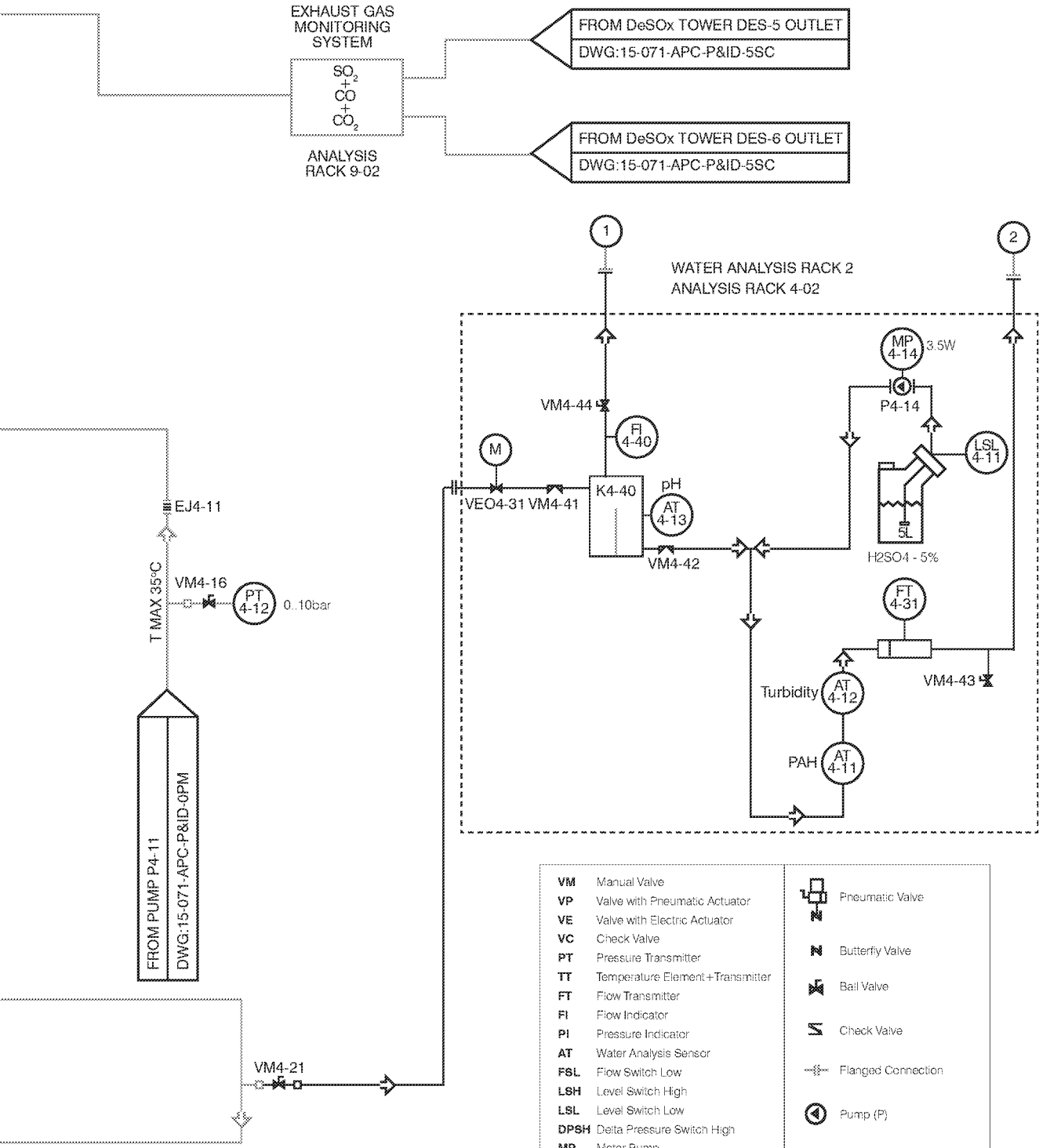
Nitrate limit (mg/l) = 60 * 45 * Pow(MW) / SW(m^3/h)

where:

- Pow(MW) = generated power, in MW
- SW(m^3/h) = seawater flow, in m^3/h

Note: The Nitrates are monitored via periodic sampling and not continuous monitoring.


FROM ANALYSIS RACK 5-03
DWG:15-071-APC-P&ID-5SC
FROM ANALYSIS RACK 5-03
DWG:15-071-APC-P&ID-5SC
FROM ANALYSIS RACK 5-02
DWG:15-071-APC-P&ID-5SC
FROM ANALYSIS RACK 5-02
DWG:15-071-APC-P&ID-5SC
FROM ANALYSIS RACK 6-03
DWG:15-071-APC-P&ID-6SC
FROM ANALYSIS RACK 6-03
DWG:15-071-APC-P&ID-6SC
FROM ANALYSIS RACK 6-02
DWG:15-071-APC-P&ID-6SC
FROM ANALYSIS RACK 6-02
DWG:15-071-APC-P&ID-6SC
TO FUNNEL SAMPLE
VM4-33
PT 4-33
-100 +100 mbar
TE 4-32
TT 4-32
0..600°C
WATER ANALYSIS RACK 4
ANALYSIS RACK 9-04
LSHH 9-16
LSH 9-15
LSL 9-14
DES-4
DeSOx TOWER
STAGE 4
STAGE 3
STAGE 2
STAGE 1
MP 9-15
0.37kW
VC9-70
VM9-75
P9-15
VM9-73
MP 9-16
0.37kW
VC9-71
VM9-76
P9-16
VM9-74
K9-70
RACKS DISCHARGE TANK
VM9-72
PT 4-32
VM4-32
OVERFLOW TO BILGE WATER TANK
LSH 4-11
EJ4-12
T MAX 250°C
-100 +100 mbar
VM4-31
PT 4-31
TE 4-31
TT 4-31
0..600°C
PT 4-13
0..2bar
PT 4-14
0..2bar
TT 4-12
0..100°C
DG#4
11.52MW
T MAX 45°C
VM4-69
SAMPLING
FI 4-32
VM4-70
FI 4-60
pH
AT 4-14
K4-60
M
VM4-71
VEO4-32
VM4-68
WATER ANALYSIS RACK 3
ANALYSIS RACK 4-03
TT 4-13
VM4-23
VM4-22
SM4-11
STATIC MIXER
VM4-25
DRAIN
FROM BACKFLUSH FILTER
DWG:15-071-APC-P&ID-0PM
VEO4-26
FROM PUMP P4-61
DWG:15-071-APC-P&ID-0PM

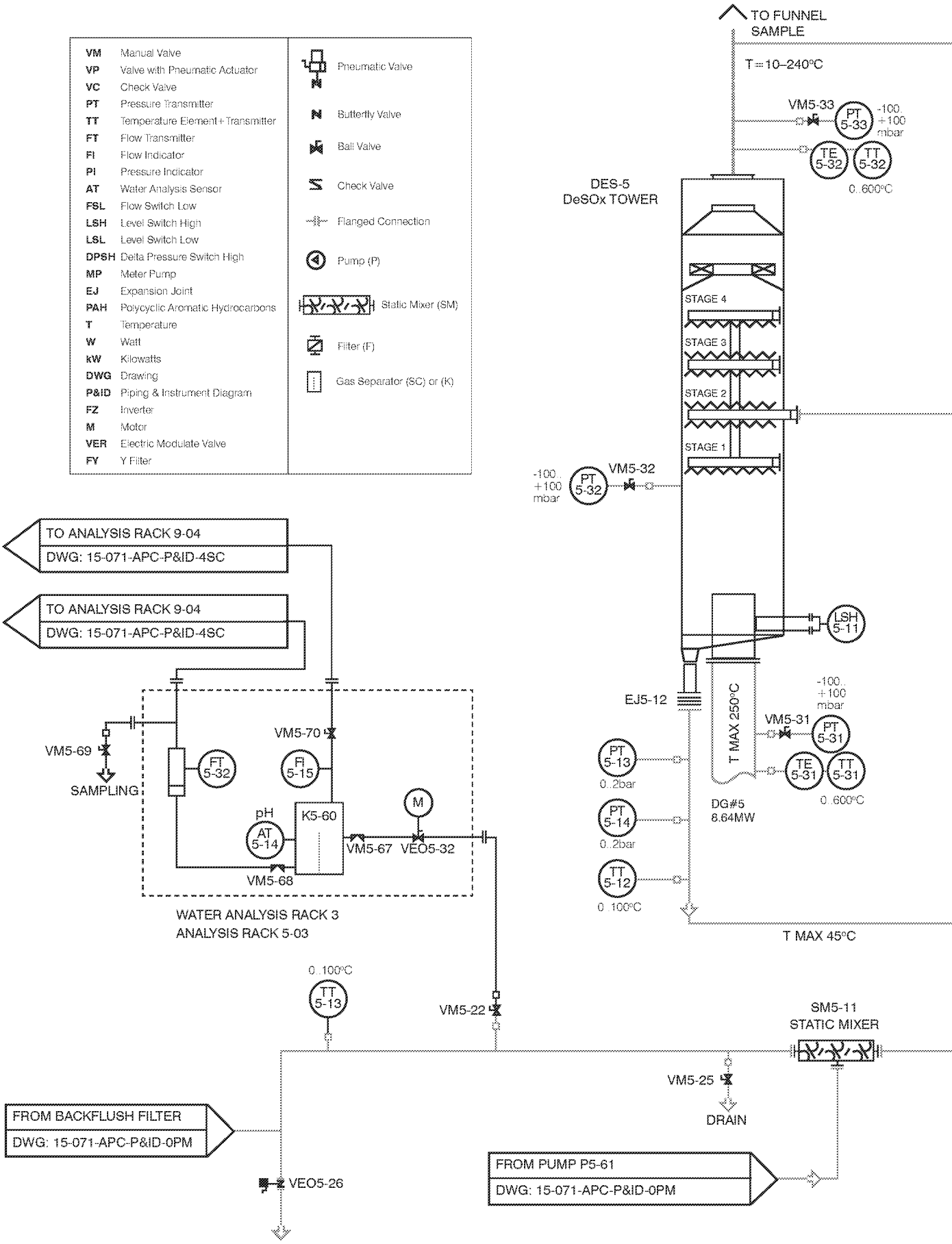


VM	Manual Valve
VP	Valve with Pneumatic Actuator
VE	Valve with Electric Actuator
VC	Check Valve
PT	Pressure Transmitter
TT	Temperature Element+Transmitter
FT	Flow Transmitter
FI	Flow Indicator
PI	Pressure Indicator
AT	Water Analysis Sensor
FSL	Flow Switch Low
LSH	Level Switch High
LSL	Level Switch Low
DPSH	Delta Pressure Switch High
MP	Meter Pump
EJ	Expansion Joint
PAH	Polycyclic Aromatic Hydrocarbons
T	Temperature
W	Watt
kW	Kilowatts
DWG	Drawing
P&ID	Piping & Instrument Diagram
FZ	Inverter
M	Motor
VER	Electric Modulate Valve
FY	Y Filter

Pneumatic Valve
Butterfly Valve
Ball Valve
Check Valve
Flanged Connection
Pump (P)
Static Mixer (SM)
Filter (F)
Gas Separator (SC) or (K)

Figure 1. Exhaust Gas Cleaning System – P&ID DG#4

VM	Manual Valve
VP	Valve with Pneumatic Actuator
VC	Check Valve
PT	Pressure Transmitter
TT	Temperature Element+Transmitter
FT	Flow Transmitter
FI	Flow Indicator
PI	Pressure Indicator
AT	Water Analysis Sensor
FSL	Flow Switch Low
LSH	Level Switch High
LSL	Level Switch Low
DPSH	Delta Pressure Switch High
MP	Meter Pump
EJ	Expansion Joint
PAH	Polycyclic Aromatic Hydrocarbons
T	Temperature
W	Watt
kW	Kilowatts
DWG	Drawing
P&ID	Piping & Instrument Diagram
FZ	Inverter
M	Motor
VER	Electric Modulate Valve
FY	Y Filter



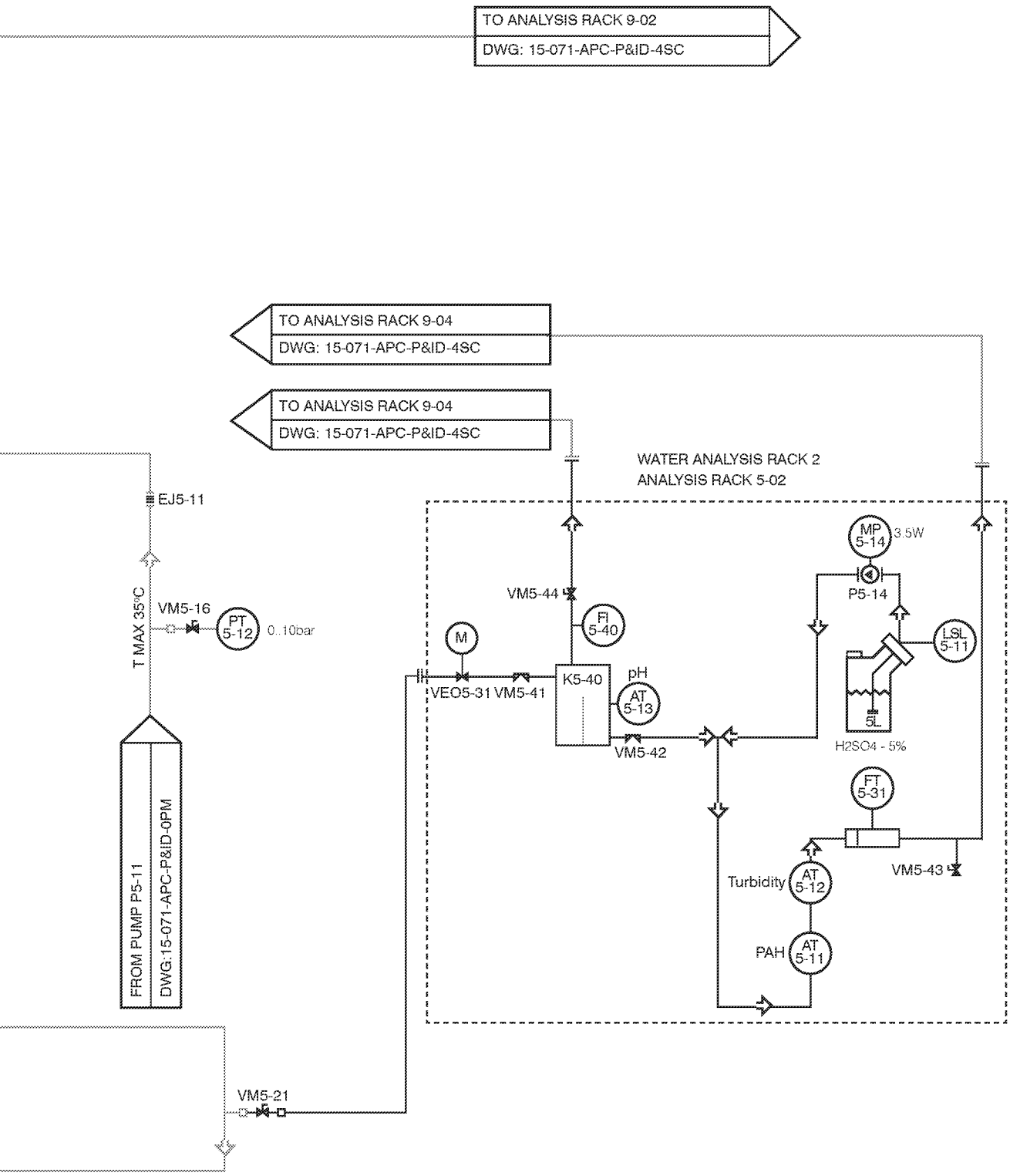
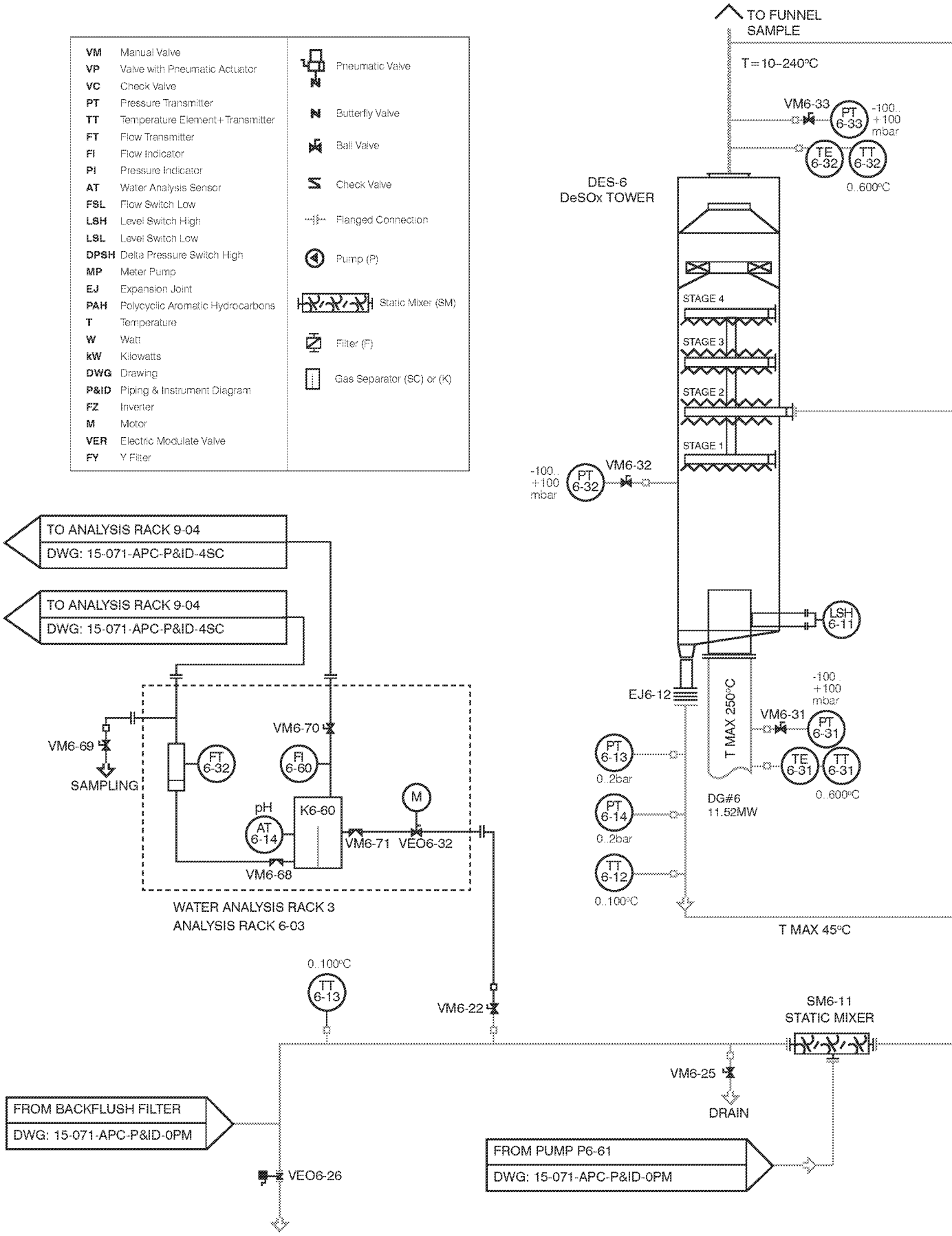


Figure 2. Exhaust Gas Cleaning System – P&ID DG#5


VM Manual Valve
VP Valve with Pneumatic Actuator
VC Check Valve
PT Pressure Transmitter
TT Temperature Element+Transmitter
FT Flow Transmitter
FI Flow Indicator
PI Pressure Indicator
AT Water Analysis Sensor
FSL Flow Switch Low
LSH Level Switch High
LSL Level Switch Low
DPSH Delta Pressure Switch High
MP Meter Pump
EJ Expansion Joint
PAH Polycyclic Aromatic Hydrocarbons
T Temperature
W Watt
kW Kilowatts
DWG Drawing
P&ID Piping & Instrument Diagram
FZ Inverter
M Motor
VER Electric Modulate Valve
FY Y Filter
Pneumatic Valve
Butterfly Valve
Ball Valve
Check Valve
Flanged Connection
Pump (P)
Static Mixer (SM)
Filter (F)
Gas Separator (SC) or (K)
TO FUNNEL SAMPLE
T=10-240°C
VM6-33
PT 6-33
-100..+100 mbar
TE 6-32
TT 6-32
0..600°C
DES-6
DeSOx TOWER
STAGE 4
STAGE 3
STAGE 2
STAGE 1
-100..+100 mbar
PT 6-32
VM6-32
TO ANALYSIS RACK 9-04
DWG: 15-071-APC-P&ID-4SC
TO ANALYSIS RACK 9-04
DWG: 15-071-APC-P&ID-4SC
LSH 6-11
EJ6-12
T MAX 250°C
-100 +100 mbar
VM6-31
PT 6-31
TE 6-31
TT 6-31
0..600°C
PT 6-13
0..2bar
PT 6-14
0..2bar
TT 6-12
0..100°C
DG#6
11.52MW
T MAX 45°C
VM6-69
SAMPLING
FT 6-32
VM6-70
FI 6-60
pH
AT 6-14
K6-60
M
VM6-71
VEO6-32
VM6-68
WATER ANALYSIS RACK 3
ANALYSIS RACK 6-03
0..100°C
TT 6-13
VM6-22
SM6-11
STATIC MIXER
VM6-25
DRAIN
FROM BACKFLUSH FILTER
DWG: 15-071-APC-P&ID-0PM
FROM PUMP P6-61
DWG: 15-071-APC-P&ID-0PM
VEO6-26

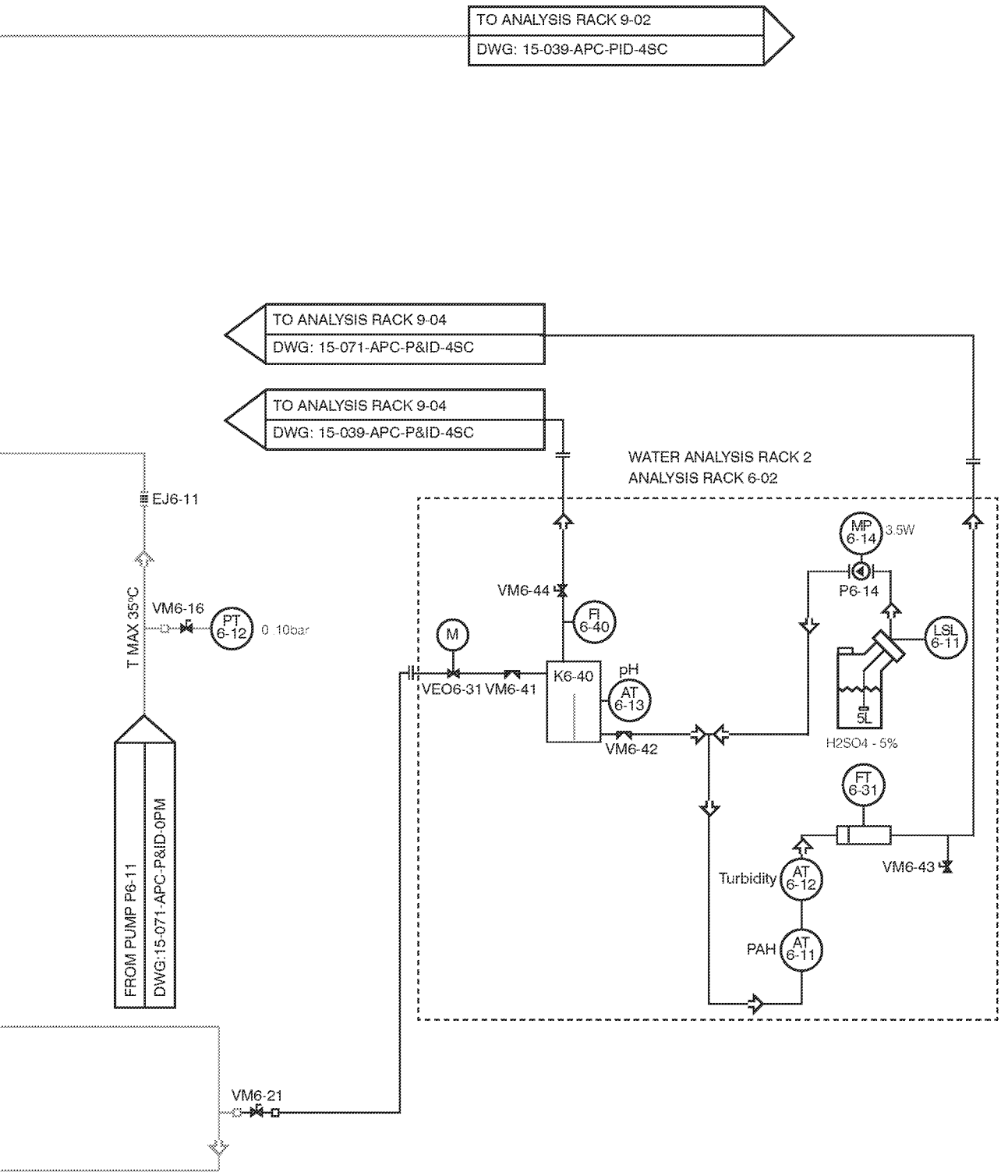
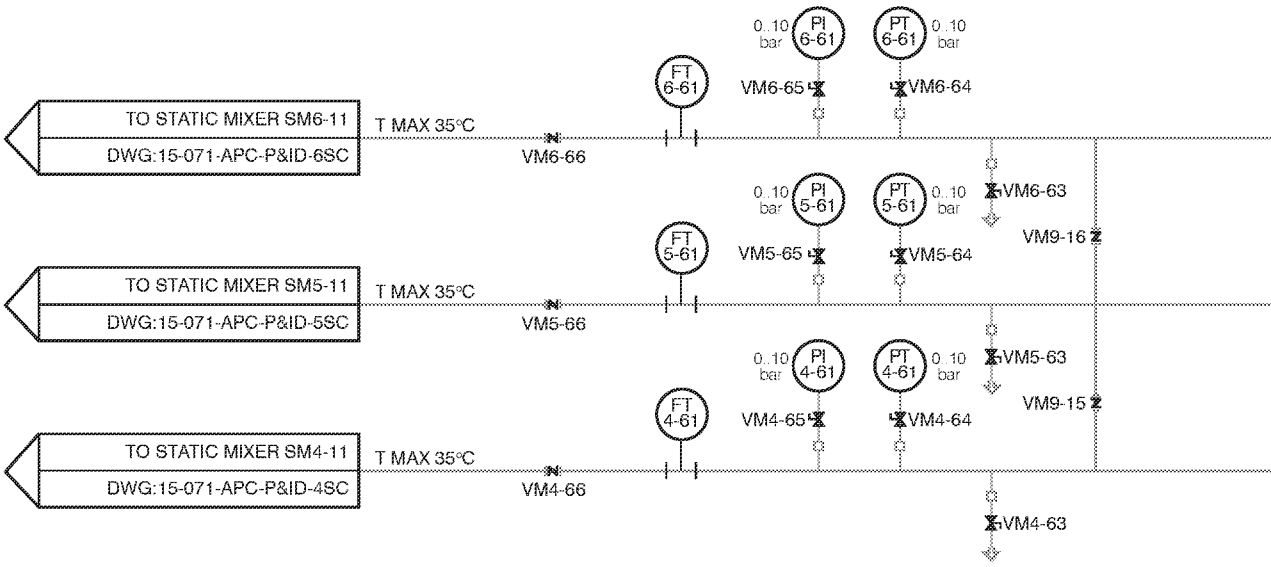
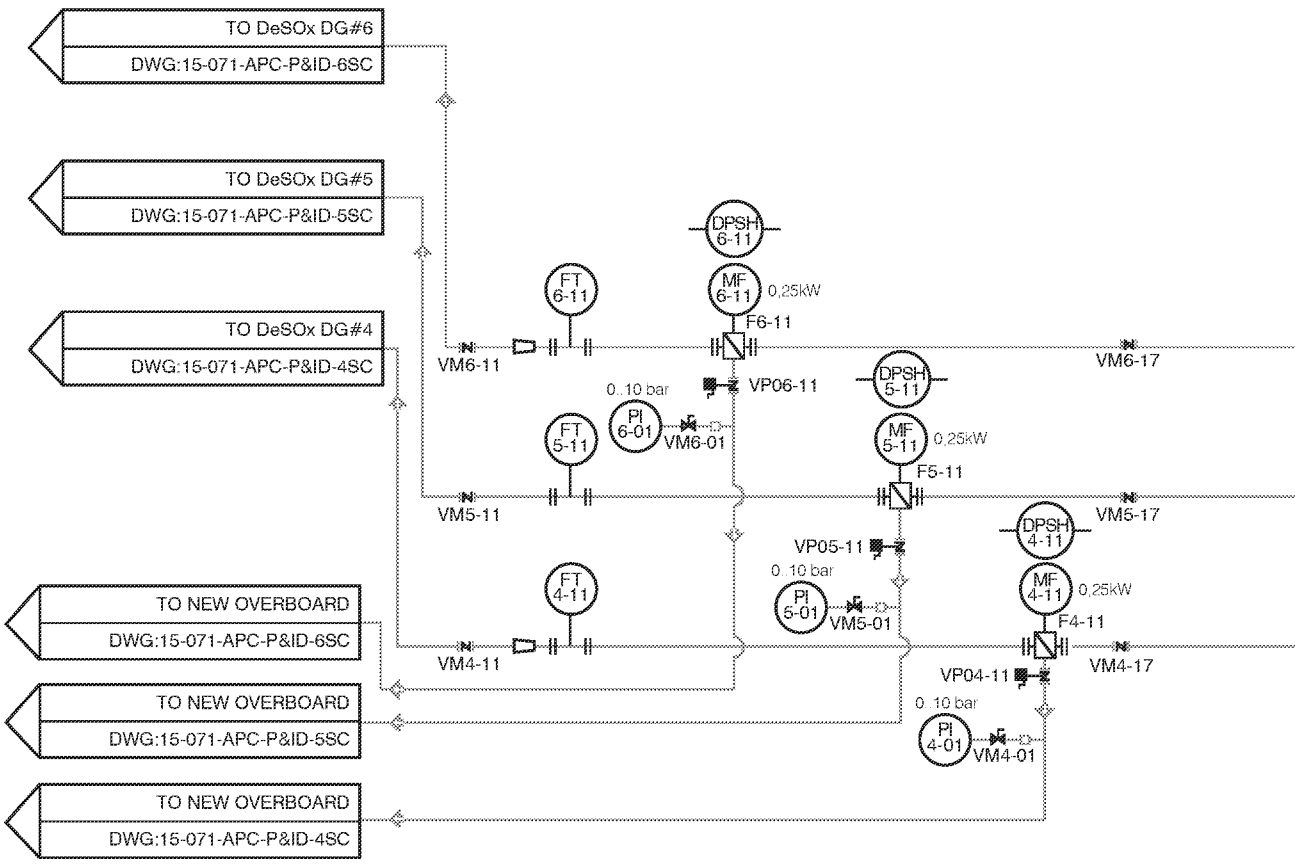


Figure 3. Exhaust Gas Cleaning System – P&ID DG#6


TO STATIC MIXER SM6-11
DWG:15-071-APC-P&ID-6SC
T MAX 35°C
VM6-66
FT 6-61
0..10 bar
PI 6-61
PT 6-61
0..10 bar
VM6-65
VM6-64
VM6-63
VM9-16
TO STATIC MIXER SM5-11
DWG:15-071-APC-P&ID-5SC
T MAX 35°C
VM5-66
FT 5-61
0..10 bar
PI 5-61
PT 5-61
0..10 bar
VM5-65
VM5-64
VM5-63
VM9-15
TO STATIC MIXER SM4-11
DWG:15-071-APC-P&ID-4SC
T MAX 35°C
VM4-66
FT 4-61
0..10 bar
PI 4-61
PT 4-61
0..10 bar
VM4-65
VM4-64
VM4-63


TO DeSOx DG#6
DWG:15-071-APC-P&ID-6SC
TO DeSOx DG#5
DWG:15-071-APC-P&ID-5SC
TO DeSOx DG#4
DWG:15-071-APC-P&ID-4SC
TO NEW OVERBOARD
DWG:15-071-APC-P&ID-6SC
TO NEW OVERBOARD
DWG:15-071-APC-P&ID-5SC
TO NEW OVERBOARD
DWG:15-071-APC-P&ID-4SC
DPSH 6-11
FT 6-11
MF 6-11
0,25kW
F6-11
VM6-11
VM6-17
0..10 bar
VP06-11
PI 6-01
VM6-01
DPSH 5-11
FT 5-11
MF 5-11
0,25kW
F5-11
VM5-11
VM5-17
DPSH 4-11
VP05-11
0..10 bar
PI 5-01
VM5-01
FT 4-11
MF 4-11
0,25kW
F4-11
VM4-11
VM4-17
VP04-11
0..10 bar
PI 4-01
VM4-01

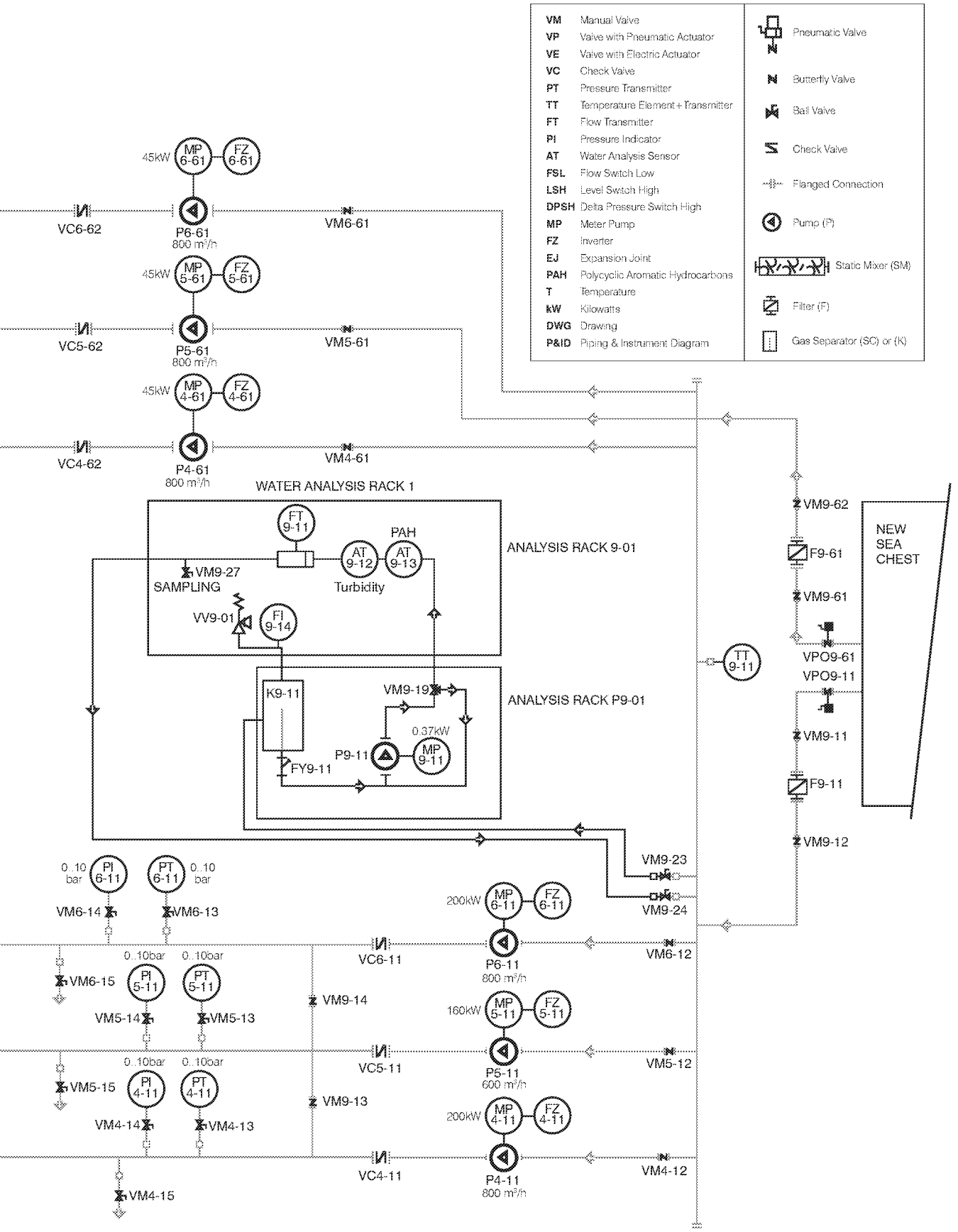


Figure 4. Exhaust Gas Cleaning System – P&ID Pumps

3 Main Components

The following table details the functions of the main components of the Ecospray EGC System.

Unit
DeSOx Tower
Sprayer Nozzles
SW Pump
SW Pump Motor
SW Pump Inverter Starter
Dilution Pump
Dilution Pump Motor
Dilution Pump Inverter Starter
Automatic Self-Cleaning SW Filter
Static Mixer
Water Analysis Instruments
Gas Analyzer
Main Panel
VDUs Touchscreen

Table 2. Main Components

3.1 Main Automatic Components and Sensors for DG#4

- (P4 -11) Seawater Pump – RPM regulation by Frequency Converter
- (FT4 -11) Seawater flow transmitter
- (PT4 -11) Seawater pressure transmitter at Seawater Pump delivery
- (P4 -61) Dilution Pump
- (FT4 -61) Dilution seawater flow transmitter
- (PT4 -61) Dilution seawater pressure transmitter at Dilution Pump/water delivery
- (PT4 -12) Seawater pressure transmitter at DeSOx Tower inlet
- (TT9 -11) Seawater temperature transmitter at DeSOx Tower inlet
- (PT4 -31) Exhaust gas pressure transmitter at DeSOx Tower inlet
- (TT4 -31) Exhaust gas temperature transmitter at DeSOx Tower inlet
- (PT4 -32) Exhaust gas pressure transmitter inside the DeSOx Tower
- (PT4 -33) Exhaust gas pressure transmitter at DeSOx Tower outlet
- (TT4 -32) Exhaust gas temperature transmitter at DeSOx Tower outlet
- (LSH 4-11) Level switch high of DeSOx Tower – Level switch high = 600mm from Tower bottom
- (PT4 -13) Wash-water pressure transmitter at DeSOx Tower outlet
- (PT4 -14) Wash-water pressure transmitter at DeSOx Tower outlet
- (TT4 -12) Wash-water temperature transmitter at DeSOx Tower outlet
- (TT4 -13) Wash-water temperature transmitter at Static Mixer outlet
- Gas Analyzer at funnel – monitors CO_2, SO_2
- Sea Suction Rack (Rack 1) – monitors PAH (AT9 -13) and Turbidity (AT9 -12)
- DeSOx Outlet Rack (Rack 2) – monitors PAH (AT4 -11), Turbidity (AT4 -12) and pH (AT4 -13)
- Overboard Discharge Rack (Rack 3) – monitors pH (AT4 -14)

3.2 Main Automatic Components and Sensors for DG#5

- (P5 -11) Seawater Pump – RPM regulation by Frequency Converter
- (FT5 -11) Seawater flow transmitter
- (PT5 -11) Seawater pressure transmitter at Seawater Pump delivery
- (P5 -61) Dilution Pump
- (FT5 -61) Dilution seawater flow transmitter
- (PT5 -61) Dilution seawater pressure transmitter at Dilution Pump/water delivery
- (PT5 -12) Seawater pressure transmitter at DeSOx Tower inlet
- (TT9 -11) Seawater temperature transmitter at DeSOx Tower inlet
- (PT5 -31) Exhaust gas pressure transmitter at DeSOx Tower inlet
- (TT5 -31) Exhaust gas temperature transmitter at DeSOx Tower inlet
- (PT5 -32) Exhaust gas pressure transmitter inside the DeSOx Tower
- (PT5 -33) Exhaust gas pressure transmitter at DeSOx Tower outlet
- (TT5 -32) Exhaust gas temperature transmitter at DeSOx Tower outlet
- (LSH 5-11) Level switch high of DeSOx Tower – Level switch high = 600mm from Tower bottom
- (PT5 -13) Wash-water pressure transmitter at DeSOx Tower outlet
- (PT5 -14) Wash-water pressure transmitter at DeSOx Tower outlet
- (TT5 -12) Wash-water temperature transmitter at DeSOx Tower outlet
- (TT5 -13) Wash-water temperature transmitter at Static Mixer outlet
- Gas Analyzer at funnel – monitors CO_2, SO_2
- Sea Suction Rack (Rack 1) – monitors PAH (AT9 -13) and Turbidity (AT9 -12)
- DeSOx Outlet Rack (Rack 2) – monitors PAH (AT5 -11), Turbidity (AT5 -12) and pH (AT5 -13)
- Overboard Discharge Rack (Rack 3) – monitors pH (AT5 -14)

3.3 Main Automatic Components and Sensors for DG#6

- (P6-11) Seawater Pump – RPM regulation by Frequency Converter
- (FT6-11) Seawater flow transmitter
- (PT6-11) Seawater pressure transmitter at Seawater Pump delivery
- (P6-61) Dilution Pump
- (FT6-61) Dilution seawater flow transmitter
- (PT6-61) Dilution seawater pressure transmitter at Dilution Pump/water delivery
- (PT6-12) Seawater pressure transmitter at DeSOx Tower inlet
- (TT9-11) Seawater temperature transmitter at DeSOx Tower inlet
- (PT6-31) Exhaust gas pressure transmitter at DeSOx Tower inlet
- (TT6-31) Exhaust gas temperature transmitter at DeSOx Tower inlet
- (PT6-32) Exhaust gas pressure transmitter inside the DeSOx Tower
- (PT6-33) Exhaust gas pressure transmitter at DeSOx Tower outlet
- (TT6-32) Exhaust gas temperature transmitter at DeSOx Tower outlet
- (LSH 6-11) Level switch high of DeSOx Tower – Level switch high = 600mm from Tower bottom
- (PT6-13) Wash-water pressure transmitter at DeSOx Tower outlet
- (PT6-14) Wash-water pressure transmitter at DeSOx Tower outlet
- (TT6-12) Wash-water temperature transmitter at DeSOx Tower outlet
- (TT6-13) Wash-water temperature transmitter at Static Mixer outlet
- Gas Analyzer at funnel – monitors CO_2, SO_2
- Sea Suction Rack (Rack 1) – monitors PAH (AT9-13) and Turbidity (AT9-12)
- DeSOx Outlet Rack (Rack 2) – monitors PAH (AT6-11), Turbidity (AT6-12) and pH (AT6-13)
- Overboard Discharge Rack (Rack 3) – monitors pH (AT6-14)

4 Operating Limits

The following table presents operating limits for the EGC System when the system is in the WET condition, there are no operating limits on the system when it is operating in the DRY condition.

		DG#4, DG#5 and DG#6
Operating limits, or range of operating values		
Max. Fuel oil sulphur content [% m/m]		**3.5**
Salinity levels		[nac]
Wash-water additives		[nac]
Minimum wash-water inlet alkalinity [µmol kg^{-1}]		**1300**
Minimum dilution water inlet alkalinity [µmol kg^{-1}]		**1300**
Exhaust gas mass flow rate [kg/h] (**Note:** Max. value corresponds to 85% MCR)	Min	[nac]
	Max	65,310 (DG#4, DG#6) 50,845 (DG#5)
Exhaust gas temperature at DeSOx Tower inlet [°C]	Min	[nac]
	Max	380
Exhaust gas temperature at DeSOx Tower outlet [°C] (with the DeSOx Tower in operation)	Min	[nac]
	Max	10°C above seawater temp.
Exhaust gas pressure at DeSOx Tower inlet [hPa]	Min	[nac]
	Max	40
Exhaust gas differential pressure across DeSOx Tower [hPa]	Min	[nac]
	Max	**40**
Wash-water flow rate [m^3/h]	Min	**350**
	Max	**800** (DG#4, DG#6) **600** (DG#5)
Wash-water pressure at nozzles [barg]	Min	**0.3**
	Max	[nac]

Table 3. Operating Limits **Note:** [nac] = not a constraint

Note: The parameters highlighted in **bold** in the table above are operating limits that are connected with the compliant operation of the EGC System, the other parameters are manufacturers' advised reasonable operating ranges.

5 Absorbing Seawater Alkalinity

Ocean Alkalinity (A_T) is usually constant and high; approximately 2200-2400 µmol kg^{-1}.

Alkalinity in coastal areas, ports, rivers and estuaries is mainly affected by the different drainage areas of the inflowing rivers, resulting in large variations in the chemical quality. Additionally, rivers running through soil rich in carbonates will be high in alkalinity.

In general, the alkalinity in the Baltic Sea is normally lower than in other sea areas because of the minimal exchange of water through the Danish straits.

At low alkalinity levels the seawater DeSOx Tower can still operate, but it leads to lower cleaning efficiency and to low effluent pH figures.

Using HFO with 3.5% m/m sulphur content when the engine load is 85% MCR, the minimum alkalinity to comply with the required SO_2/CO_2 ratio of 4.3 is about 1300 µmol kg^{-1}. Alkalinity levels this low can be found in some ports/harbours on rivers, or in the eastern Baltic.

This limit is strongly affected by the level of sulphur in the fuel (low % sulphur HFO requires less alkalinity for removing sulphur to meet the SO_2/CO_2 ratio of 4.3).

	Seawater	Baltic Sea	Estuarine waters	Freshwater
Temp (°C)	5–15	0–20	1–20	0–20
Salinity (*psu)	32–37	3–9	0.5–17	0–0.5
A_T (µmol kg^{-1})	2300–2600	700–2000	0.1–5000	0.1–5000

Table 4. Typical Alkalinity of Seawater

* psu = Practical Salinity Unit

6 Ecospray EGC System Compliance Operating Restrictions

The principal operating requirements for the DeSOx Tower to demonstrably maintain the SO_2/CO_2 ratio in accordance with the requirements of the Guidelines are:

- HFO sulphur content not to exceed 3.5% m/m
- Ecospray EGC System in operation
- Exhaust gas monitoring system in operation (see Onboard Monitoring Manual)
- Wash-water monitoring system in operation (see Onboard Monitoring Manual)
- Data recording system in operation (see Onboard Monitoring Manual)
- Seawater Alkalinity above 1300 μmol kg^{-1}.
- Engine Load not greater than 85%, if HFO sulphur content is 3.5% m/m and seawater Alkalinity is 1300 μmol kg^{-1}.

7 Troubleshooting and Corrective Actions

7.1 Non-Compliance Events

If a non-compliance event occurs whereby the system exceeds the compliance limits for any of the following, SO_2/CO_2 ratio, PAH, Turbidity or pH, then a series of troubleshooting steps are suggested. It is the intention that by following these troubleshooting steps the system will be restored to compliant operation; if, however, compliant operation cannot be restored, a corrective action (such as switching to compliant fuel) must be taken so that the ship maintains compliance with the exhaust gas emissions regulations.

A record of all non-compliance events, troubleshooting and corrective actions must be kept in the EGC Record Book.

7.1.1 SO_2/CO_2 ratio above the regulatory limit

Troubleshooting

- Check:
  - Seawater flow to the DeSOx Tower
  - Seawater pressure at DeSOx Tower Inlet
  - Seawater Pump is running (if not at 100%, increase to 100%)
  - All valves to DeSOx Tower are open
  - Seawater Automatic Filter for plugging
  - SO_2 regulation set in fully automatic mode
  - Gas analyzer is operational
  - Record SO_2 and CO_2 readings locally at the gas analyzer to check SO_2/CO_2 ratio
- Reduce the engine load

Corrective Action – if compliance cannot be restored

- Run the engine using a compliant fuel

7.1.2 Wash-water PAH and/or Turbidity above the regulatory limit

Troubleshooting

- Check seawater flow indication on all analysis racks
  - Check rack inlet filter for cleanliness
  - Purge the sensor to remove entrapped gas within the sensor housing
- Check that piping and sensors are sufficiently clean and free of combustion residuals
- Clean PAH and/or Turbidity sensors. If automatic cleaning is fitted, force a manual clean
- Check the PAH and/or Turbidity readings locally on the water analysis racks
- Check PAH and/or Turbidity sensors calibration
- Check the PAH and/or Turbidity readings with a hand held sensor
- Perform condition monitoring on the engine; if any operating parameters are abnormal, when practical stop the engine

Corrective Action – if compliance cannot be restored

- Run the engine using a compliant fuel

7.1.3 Overboard Discharge pH below the regulatory limit

Troubleshooting

- If dilution water flow rate is not at 100%, increase to 100%
- If dilution water flow rate is at 100%, increase the wash-water flow rate to 100%
- Check the flow to the Overboard Discharge analysis rack and the pH sensors
- Purge the sensor to remove entrapped gas within the sensor housing
- Clean the pH sensor
- Check the pH reading locally at the water analysis rack
- Check the pH reading with a hand held sensor
- Reduce the engine load
- Re-calibrate pH sensor
- If the sensor is still reading incorrectly, then replace it

Corrective Action – if compliance cannot be restored

- Run the engine using a compliant fuel

All events of non-compliance will result in an Alarm on the vessel's IAMCS system and will be recorded in the Compliance Computer and EGC Record Book. For further details of the monitoring systems refer to the OMM.

8 EGC System Records

Records of the EGC System, operation, compliance and maintenance will be kept as specified below. These records will be available at surveys as required to confirm the correct operation of the EGC System.

EGC System Record	Recorded in
In service operating and compliance parameters	Compliance Computer automatically (compliance report and process report)
Completed component adjustments	Ship's electronic maintenance system
Required maintenance and servicing activities	Ship's electronic maintenance system
Completed maintenance and servicing activities	Ship's electronic maintenance system
Like for like replacement of equipment/components	Ship's electronic maintenance system
Daily spot checks	EGC Record Book
Alarms and troubleshooting activities	EGC Record Book
Storage and disposal of sludge residuals	EGC Record Book
Nitrate discharge data and analysis certificates	EGC Record Book
Supporting EGC System documents; i.e. gas certificates, calibration documents and service records	EGC Record Book

Table 5. EGC System Records

By keeping all of the above records, the regulatory requirements related to the keeping of EGC System Records are fulfilled.

The operating parameters that are required by the regulations to be checked daily are recorded continuously. In addition, a daily spot check will be carried out and the record of this daily spot check recorded in the EGC Record Book. Please refer to the OMM and EGC Record Book for more detail.

All EGC System Records must be preserved for a minimum of 3 years.

8.1 Recording of Nitrate Discharge Data and Analysis

At each Renewal Survey for the International Air Pollution Prevention Certificate, the nitrate discharge data and laboratory analysis certificate(s) for a wash-water sample taken within the 3 months prior to the Renewal Survey will be required to be on board and available for review by the Administration; one sample is required for each EGC System.

The requirements for each sample are as follows:

- The sample shall be taken from the DeSOx Tower Outlet sampling point, which is located between the DeSOx Tower and the Static Mixer
- The EGC System and DG shall be in operation
- DG load and wash-water flow rate shall be recorded and the nitrate limit calculated
- The sample shall be collected in a clean plastic container
- The sample container shall be labelled in order to correctly identify the sample, as a minimum the label shall detail, vessel, sample point (i.e. Overboard Discharge), date, time and the EGC System that is being sampled (i.e. DeSOx Tower DG#1)
- In accordance with the laboratory instructions, the sample shall be stored in a chilled cooler box in a temperature-controlled environment (such as a fridge) until delivery to the laboratory. The sample shall be transported to the laboratory in a chilled cooler box provided in advance by the laboratory
- The test method for the analysis of nitrates carried out by a laboratory shall be in accordance with standard seawater analysis as described in Grasshoff et al. (1999): *Methods of Seawater Analysis*, Wiley-VCH, p. 36, and as referred to in MEPC. 259(68), 10.1.5.2

Note: In practice the nitrate sample required for the renewal survey will be taken as part of a larger wash-water sampling process, which is conducted at least annually by each ship and the results of which are submitted to the IMO.

A full procedure for this wash-water sampling process is detailed for ship staff in the 'EGC System Compliance and Sampling Handbook' and all records of the sampling and analysis results must be kept in the EGC Record Book.

Appendix A

TID7952 - Scrubber wash water pH modelling - CCL Freedom - 14 May 2015

Lloyd's Register Marine

Working together for a safer world

Carnival Corporation

Scrubber wash water pH modelling

Technical Investigation Department

TID7952

Site report for:
CCL Freedom (IMO 9333149)

Report date:
14 May 2015

1. Introduction

At the request of Carnival Corporation, the undersigned Specialist to Lloyd's Register EMEA's Technical Investigation Department (TID) (for and on behalf of Lloyd's Register Americas) assessed the dispersion of scrubber wash water for the CCL Freedom (IMO 9333149) in order to determine recommendations for operation to meet the MEPC184(59) Guidelines, Section 10.1.2.1(ii).

2. History and Background work

Reference is made is to the earlier report issued by TID for Costa Luminosa and Costa Fascinosa **[1]**, which presents the validation of the CFD model against field measurements of pH for these ships. This report is attached as an Appendix at the end of this document.

3. Scope of work

The objective of the work is to establish the discharged pH at the scrubber wash water outflow that corresponds to pH 6.5 at a distance of 4m from the outflow.

4. Procedure

Computational Fluid Dynamics (CFD) modelling of the scrubber wash water plume was performed using the commercial CFD code STAR-CCM+. The general simulation setup is described in **[1]**.

In this case, simulations were carried out with 10% air (by volume) contained in the wash water. Bubble sizes were homogeneous with 2mm diameter (validation work has shown negligible sensitivity to bubble size up to 10mm [1]).

5. Results

The results for the CCL Freedom (IMO 9333149) running at a wash water discharge rate of 800 m^3/hr and no dilution are presented in Figure 1 for the pH 8.2 sea and in Figure 2 for the pH 7.7 sea.

6. Conclusions & Recommendations

For normal sea conditions with pH of 8.2 and also in more critical areas e.g. Baltic regions with lower pH sea of 7.7, the pH is 6.5 or greater at 4 metres for from the discharge point when the wash water pH is 4.0 or greater. The pH at 4 metres will also be greater for wash water flow rates less than 800 m^3/hr.

EPA-2020-000622

Sebastiaan Zaaijer

CFD Specialist, Technical Investigation Department

14 May 2015

Sebastiaan.Zaaijer@lr.org

References

1. Alexander D. 'Scrubber Wash Water pH Modelling – Multiphase Validation', TID Report 7952, Lloyd's Register, 14 May 2015.

ED_004159_00047334-00031

Figures

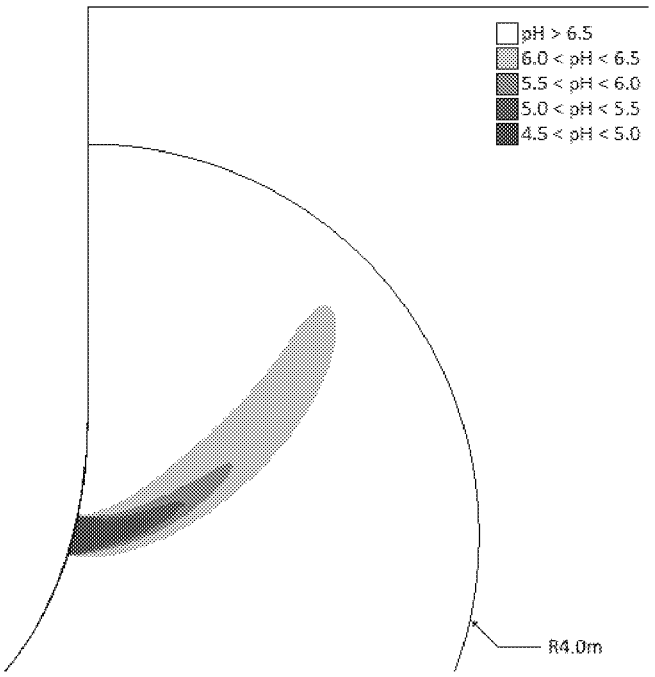


Figure 1 – pH contours for 800 m^3/hr wash water flow rate and no dilution water : pH 8.2 sea

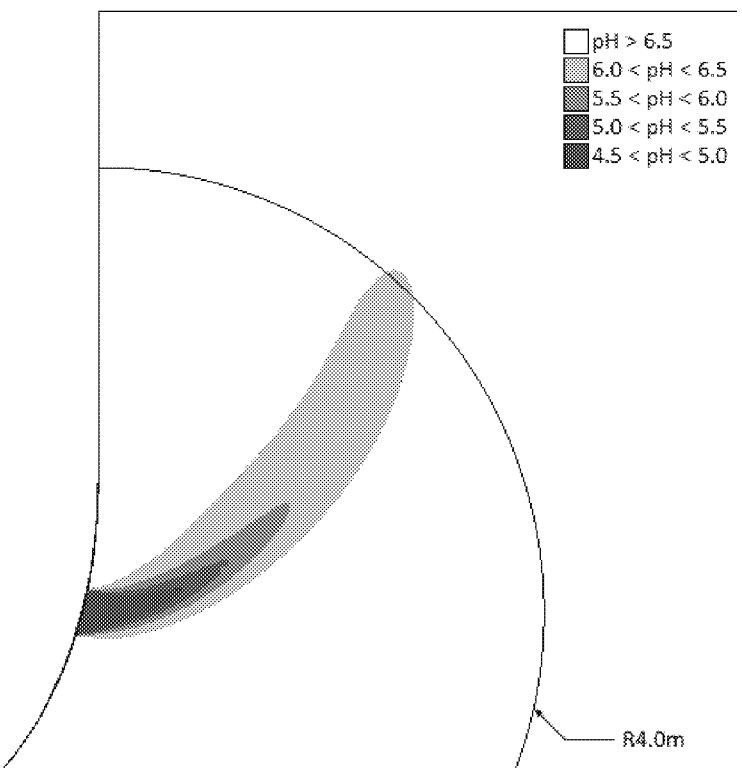


Figure 2 – pH contours for 800 m3/hr wash water flow rate and no dilution water : pH 7.7 sea

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Lloyd's Register Marine

Working together for a safer world

Carnival Corporation

Scrubber wash water pH modelling - Multiphase Validation

Technical Investigation Department

TID7952

Site report for:
Carnival Freedom & Fascinosa

Report date:
14 May 2015

1. Introduction

This document presents Computational Fluid Dynamics (CFD) modelling results of scrubber wash water dispersion overboard and the resulting pH of the surrounding sea water for the Carnival Freedom and Fascinosa.

The CFD models developed incorporate all the necessary physics to accurately capture the multi-phase interaction of wash water, entrained gas and the sea water. The gas entrained in the wash water flow has been observed to have a significant impact on the dispersion into the sea water. Entrained gas that forms bubbles will cause the wash water plume to rise to the surface and also improve turbulent mixing with the seawater.

The main objectives of the work presented in this report are to:

- Validate the developed CFD model against physical measurements of pH
- Determine the gas loading in the wash water flow that will result in the observed behaviour

Once the CFD model is validated and the nominal wash water gas loading is determined, it can be used to assess the minimum pH at ship side to meet MEPC184(59) Guidelines, Section 10.1.2.1(ii) of having a pH at 4 metres from the discharge point equal to or greater than 6.5. This will be the subject of subsequent reports that will use this report as model validation.

2. Scope of Work

The pH levels for the Carnival Freedom were considered for a wash water flow rate of 515 m^3/hr (as measured in trials [1]). The wash water was taken to be undiluted with a pH of 3.44. The Freedom has a discharge outlet with a diameter of 0.4m at a depth of 5.4 m below the water surface.

The pH levels for the Carnival Fascinosa were considered for a wash water flow rate of 500 m^3/hr (as measured in trials [2]). The wash water was taken to be undiluted with a pH of 4.0. The Freedom has a discharge outlet with a diameter of 0.4m at a depth of 3.6 m below the water surface.

The velocity from the outlet was taken to be uniform and containing 10% gas by volume. The sea was considered to be of moderately alkaline sea with pH 8.2.

3. Procedure

Computational Fluid Dynamics (CFD) modelling of the scrubber wash water plume was performed using the commercial CFD code STAR-CCM+. The dispersion of the wash water into the surrounding sea was determined using a 3D model of the hull geometry based on hull lines provided by Carnival Corporation. A polyhedral mesh was created (774 000 cells for the Freedom and 530 000 cells for the Fascinosa). A very slight current, parallel to the side of the vessel, was applied to stabilise the solution. The free surface was not modelled explicitly, and instead was assumed to be a flat, frictionless plane. All other structures, including jetties, piers and other vessels, were assumed to be sufficiently far from the vessel to have negligible influence.

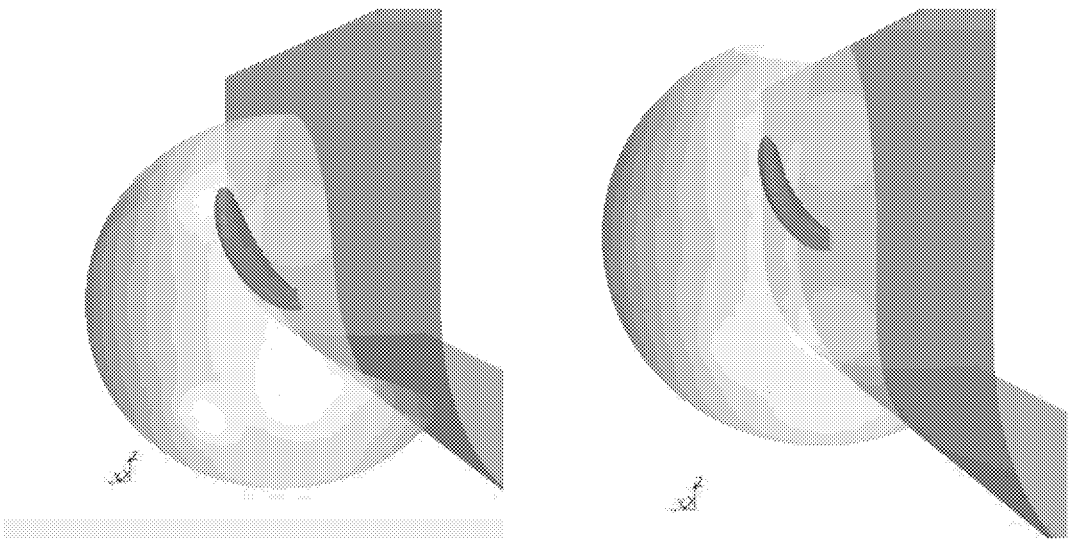
The water was assumed to be steady and incompressible. Turbulence was modelled using the Reynolds-Averaged Navier-Stokes (RANS) realizable k-ε model. The bulk material properties (density and viscosity) of both the scrubber wash water and the background sea water were assumed to be the same at equivalent temperatures.

The Zeebe and Wolf-Gladrow titration curve was used to predict pH of the wash water diluted by the sea water.

The gas entrained in the wash water was taken to be air at standard temperature. Two different average bubble diameters (2 mm and 10 mm) were modelled to assess sensitivity to bubble size. The effects of bubble break-up, bubble coalescence, and the variations in turbulence in the flow due to the gas phase were incorporated in the flow model. The water surface was assumed to be permeable to the gas.

4. Results

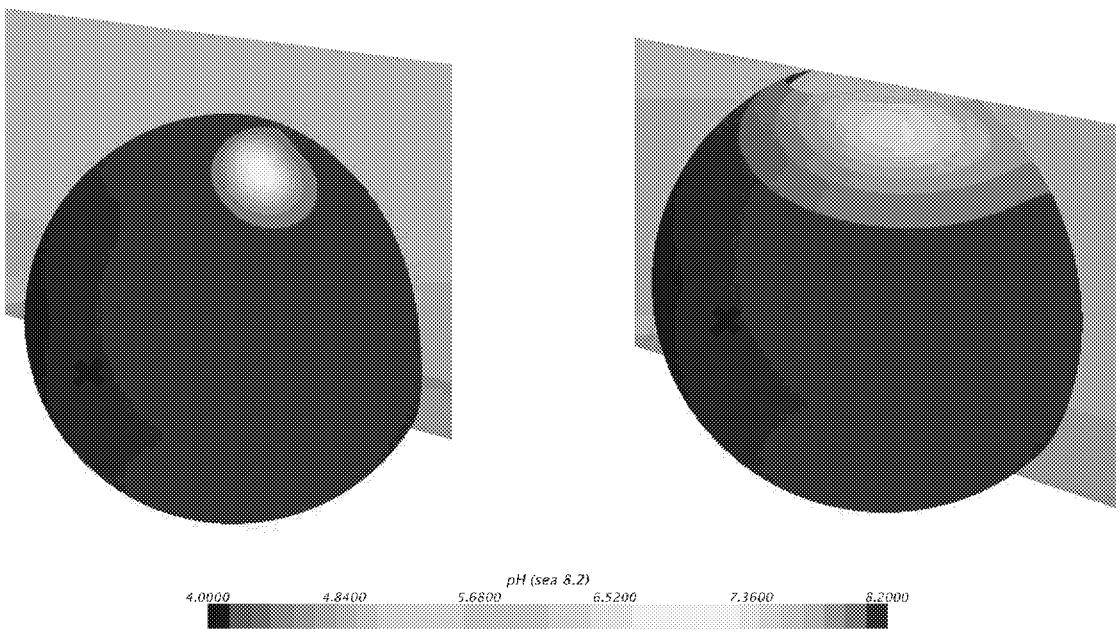
The gas entrained in the wash water acts to lift the wash water plume to the surface. Buoyancy forces lift the gas and wash water along with it towards the surface. Figure 1 shows the surface formed by the pH 6.5 contour level for the 2mm bubble results (the surfaces from the 10mm results are indistinguishable from these). The curvature of the plume and increased turbulence serve to increase the dilution of the wash water compared to cases that do not consider the gas content.



a) Carnival Freedom **b) Carnival Fascinosa**

Figure 1: pH 6.5 surface in dark blue surrounded by the 4m assessment zone (2 mm bubbles)

The pH contours on the 4 m radius surface are shown in Figure 2. It can be observed that the pH levels at the depth of the outflow port (marked with an x) are equivalent to the nominal sea water pH values (as observed in the Carnival measurement trials), while the minimum pH levels are found at the surface in front of the outflow port (slightly to the side due to the small cross current).



Carnival Freedom Carnival Fascinosa

Figure 2: pH at 4 m (2 mm bubbles)

In order to compare to the measured values, the pH level contours 0.5 m below the surface for the Freedom and on the surface for the Fascinosa are shown in Figure 3 and Figure 4. This was done because the measurements for the Freedom were made 0.5 m below the water surface, while the measurements for the Fascinosa were made on the water surface.

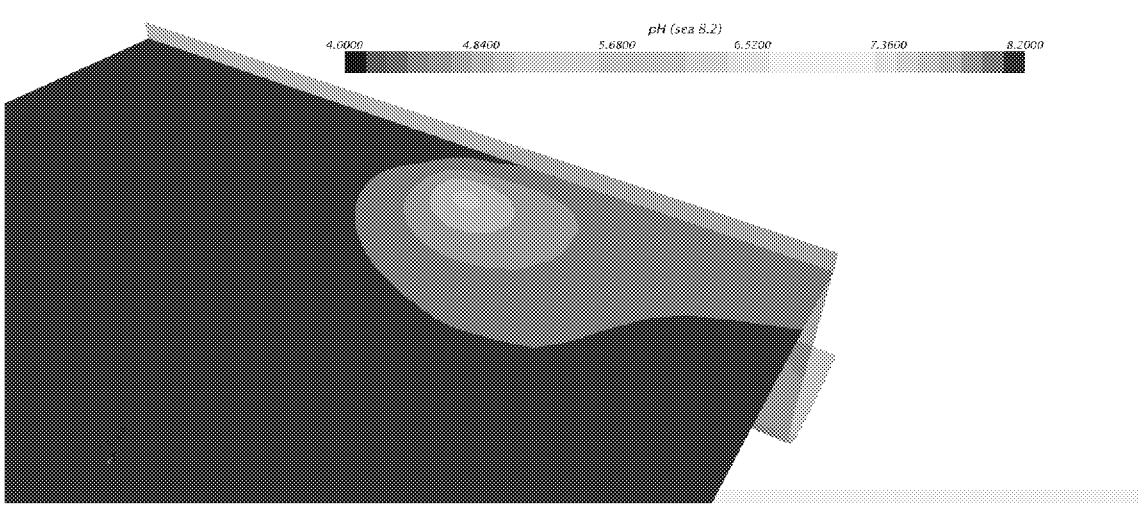


Figure 3: pH at 0.5 m below water surface for Carnival Freedom (2 mm bubbles)

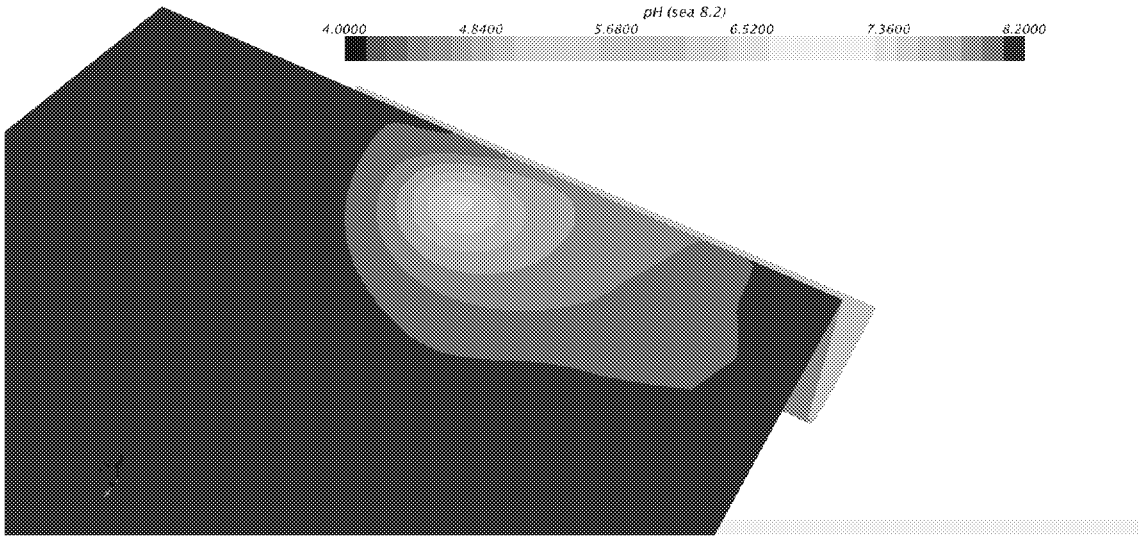


Figure 4: pH on water surface for Carnival Fascinosa (2 mm bubbles)

The pH value and distance from the ship side where pH measurements were made for the physical measurements and pH at the same location in the CFD simulations are compared Table 1. The assumed 10 % gas content in the wash water results in calculated minimum pH levels that are similar (within expected measurement error of 10%) to the measured values. The location of the minimums is also in keeping with the measured values, unlike calculations that do not include gas content.

Ship	Measurement location Distance from Ship	Minimum pH Value		
		Measured	CFD	
			2mm	10mm
Freedom	1m	7.5	7.9	7.9
Fascinosa	2m	7.2	7.4	7.4

Table 1: Comparison of measured pH and pH determined from CFD model

The minimum pH levels at a 4 m radius from the outflow for a pH 8.2 sea and a pH 7.7 sea are given in Table 2 for the CFD calculations. The minimum pH levels are in excess of the required 6.5 pH at a 4 m radius in this case.

Ship	Minimum pH Value at 4 m			
	pH 7.7 sea		pH 8.2 sea	
	2mm	10mm	2mm	10mm
Freedom	6.65	6.63	7.03	7.01
Fascinosa	6.94	6.95	7.33	7.35

Table 2: Comparison of measured pH and pH determined from CFD model (bracket values for 10 mm bubbles)

5. Conclusions

This validation study has shown that LR's CFD model that includes gas modelling produces significantly more realistic results in terms of observed flow behaviour and physical pH measurements.

The CFD simulations have shown agreement with measured pH levels within expected measurement error (10%).

A low gas loading (conservative) of 10% by volume has shown to give good agreement with measured behaviour.

It is recommended that all wash water modelling incorporate multiphase gas behaviour and a gas loading of 10% by volume.

The bubble size has an insignificant effect on the pH value 4m from the discharge point.

6. References

[1] Ross Kanzleiter, "Wash Water pH on Carnival Freedom", Carnival, 1 May 2015

[2] De Angeles E and Cazzola D, "Costa Fascinosa – EGCS wash water discharge pH measurement", report nr 12224 rev 1, 11 May 2015

Dr. Derrick Alexander

Senior Research Engineer, LR Marine

14 May 2015

Derrick.Alexander@lr.org

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Telephone: **+39 0131 854021**
(Active 9am to 5pm CET – Mon to Fri)

Appointment

From: Magorrian, Matthew [Magorrian.Matthew@epa.gov]
Sent: 10/1/2015 7:31:18 PM
To: tdow@carnival.com; MKaczmarek@carnival.com; Samulski, Michael [samulski.michael@epa.gov]; Brown, Dan [Brown.Dan@epa.gov]; Zobrist, Marcus [Zobrist.Marcus@epa.gov]; Dunbar, Bill [dunbar.bill@epa.gov]

Subject: EPA/Carnival Call
Location: Conf line **Ex. 6 Personal Privacy (PP)**

Start: 10/7/2015 8:00:00 PM
End: 10/7/2015 8:30:00 PM
Show Time As: Tentative

Message

From: Faulk, Jack [Faulk.Jack@epa.gov]
Sent: 4/27/2015 1:51:13 PM
To: abrake@carnival.com
Subject: RE: Quick Question regarding washwater samples

Hi Aubrie,

For purposes of the 2013 VGP, you should submit those sampling results as part of your annual report. So, if you are conducting that monitoring now, you should submit the results as part of your 2015 annual report (that is due by February 28, 2016). I hope that helps but let me know if you need further clarification. Thanks.

Jack Faulk

From: Greuel, Justin
Sent: Friday, April 24, 2015 1:39 PM
To: Zobrist, Marcus; Faulk, Jack
Subject: FW: Quick Question regarding washwater samples

Marcus or Jack,

Are one of you the correct individual to respond to Aubrie's question below?

Thanks,

Justin G. Greuel
Director, Diesel Engine Compliance Center
U.S. Environmental Protection Agency
Office of Transportation & Air Quality
2000 Traverwood Drive
Ann Arbor, MI 48105
Phone (734) 214-4210

From: Brake, Aubrie (CarnCorp) [mailto:ABrake@carnival.com]
Sent: Thursday, April 23, 2015 5:55 PM
To: Greuel, Justin
Cc: Kaczmarek, Michael (CarnCorp); tdow@carnival.com; Tombolesi, Emilio (CarnCorp)
Subject: Quick Question regarding washwater samples

Good Afternoon Mr. Greuel,
Hope this email finds you well. My name is Aubrie Brake and I am the Manager of Environmental Policy for Carnival Corporation. I have one quick question in regards to submission of washwater sampling results.
We are in the process of collecting our initial exhaust gas cleaning system washwater samples for those ships that are currently installing systems onboard. As per the Vessel General Permit, we understand that two washwater samplings are required during the first year, one that can be completed as part of the installation of the system and another as part of the annual survey. Do we wait to submit both of these sampling results in the Annual Report, as is required for the following years, or do the sampling results taken during the installation need to be submitted at an earlier time?
Thank you for your help.
Sincerely,
Aubrie Brake

Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 10/14/2015 8:11:55 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
Subject: RE: Carnival - VGP Scrubber Washwater

I'll call your desk phone now

-----Original Message-----
From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Wednesday, October 14, 2015 4:10 PM
To: Dow, Thomas (CarnCorp)
Subject: RE: Carnival - VGP Scrubber Washwater

I'm at my desk - did you call Ex. 6 Personal Privacy (PP) Oops - just realized I gave you my cell phone by mistake. I didn't pick up thinking I was waiting for a call on my other line.

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, October 14, 2015 4:07 PM
To: Zobrist, Marcus
Subject: RE: Carnival - VGP Scrubber Washwater

Marcus,
I just left a voicemail. If you need to reschedule let me know.
Thanks,

Tom Dow

-----Original Message-----
From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Tuesday, October 13, 2015 5:01 PM
To: Dow, Thomas (CarnCorp)
Cc: Emerson, Josh; Faulk, Jack
Subject: RE: Carnival - VGP Scrubber Washwater

Tom,

Does 4pm EDT / 1 pm WDT work for you? If so, feel free to call me at Ex. 6 - Personal Privacy

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Tuesday, October 13, 2015 4:19 PM
To: Zobrist, Marcus
Subject: Carnival - VGP Scrubber Washwater

Marcus,
Are you available for a call tomorrow or Thursday for a quick call? I'm on the West Coast, so after 10:30 EDT is best for me. 10-15 minutes should be adequate.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

On Oct 7, 2015, at 2:17 PM, Zobrist, Marcus <Zobrist.Marcus@epa.gov<mailto:Zobrist.Marcus@epa.gov>> wrote:

Tom,

Good talking to you today. We're on it.

Just to make sure I've got the situation characterized correctly, is it fair to say you are currently achieving the VGP limit about 99% of the time?

Marcus Zobrist | U.S. Environmental Protection Agency Chief, Industrial Branch | (202) 564-8311 Water Permits Division |Office of Wastewater Management

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, October 07, 2015 4:42 PM
To: Zobrist, Marcus
Cc: McLerran, Dennis; Kaczmarek, Michael (CarnCorp)
Subject: Tom Dow - Carnival Contact Information

Marcus,
Thanks for taking time to discuss the Carnival Exhaust Gas Cleaning System project. As promised, below is my contact information.
I look forward to further dialogue with you and your team. I will follow up October 21st, when I'm back in Washington.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

202.347.7150 Office
Ex. 6 - Personal Privacy Mobile

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 10/13/2015 9:03:25 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
Subject: Re: Carnival - VGP Scrubber Washwater

Marcus
I'll call tomorrow at 4pm EDT.
Thanks,

Tom

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Tuesday, October 13, 2015 05:01 PM
To: Dow, Thomas (CarnCorp)
Cc: Emerson, Josh <Emerson.Josh@epa.gov>; Faulk, Jack <Faulk.Jack@epa.gov>
Subject: RE: Carnival - VGP Scrubber Washwater

Tom,

Does 4pm EDT / 1 pm WDT work for you? If so, feel free to call me at Ex. 6 - Personal Privacy

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Tuesday, October 13, 2015 4:19 PM
To: Zobrist, Marcus
Subject: Carnival - VGP Scrubber Washwater

Marcus,
Are you available for a call tomorrow or Thursday for a quick call? I'm on the West Coast, so after 10:30 EDT is best for me. 10-15 minutes should be adequate.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

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Tom,

Good talking to you today. We're on it.

Just to make sure I've got the situation characterized correctly, is it fair to say you are currently achieving the VGP limit about 99% of the time?

Marcus Zobrist | U.S. Environmental Protection Agency Chief, Industrial Branch | (202) 564-8311 Water Permits Division |Office of Wastewater Management

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, October 07, 2015 4:42 PM
To: Zobrist, Marcus
Cc: McLerran, Dennis; Kaczmarek, Michael (CarnCorp)
Subject: Tom Dow - Carnival Contact Information

Marcus,
Thanks for taking time to discuss the Carnival Exhaust Gas Cleaning System project. As promised, below is my contact information.
I look forward to further dialogue with you and your team. I will follow up October 21st, when I'm back in Washington.

Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

202.347.7150 Office
Ex. 6 - Personal Privacy Mobile

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 10/7/2015 9:25:44 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
CC: McLerran, Dennis [mclerran.dennis@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Subject: RE: Tom Dow - Carnival Contact Information

Marcus,
I need to review more data and get back to you on that.
Regards,

Tom

From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Wednesday, October 07, 2015 5:17 PM
To: Dow, Thomas (CarnCorp)
Cc: McLerran, Dennis; Kaczmarek, Michael (CarnCorp)
Subject: RE: Tom Dow - Carnival Contact Information

Tom,

Good talking to you today. We're on it.

Just to make sure I've got the situation characterized correctly, is it fair to say you are currently achieving the VGP limit about 99% of the time?

Marcus Zobrist | U.S. Environmental Protection Agency
Chief, Industrial Branch | (202) 564-8311
Water Permits Division | Office of Wastewater Management

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, October 07, 2015 4:42 PM
To: Zobrist, Marcus
Cc: McLerran, Dennis; Kaczmarek, Michael (CarnCorp)
Subject: Tom Dow - Carnival Contact Information

Marcus,
Thanks for taking time to discuss the Carnival Exhaust Gas Cleaning System project. As promised, below is my contact information.
I look forward to further dialogue with you and your team. I will follow up October 21st, when I'm back in Washington.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

202.347.7150 Office
Ex. 6 Personal Privacy (PP) Mobile

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 11/10/2015 4:46:28 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
CC: Faulk, Jack [Faulk.Jack@epa.gov]
Subject: Re: Follow up call

Marcus
Thursday at 10:00 works for me. I'll call you. I'll be in Miami.
Thanks,

Tom

Sent from my iPad

> On Nov 10, 2015, at 11:24 AM, Zobrist, Marcus <Zobrist.Marcus@epa.gov> wrote:
>
> Tom,
>
> I'm at a conference today and tomorrow (yup, I'm working on Veteran's Day). I could do Thursday at 10 AM. Would that work for you?
>
> _____
> From: Dow, Thomas (CarnCorp) <TDow@carnival.com>
> Sent: Tuesday, November 10, 2015 11:14 AM
> To: Zobrist, Marcus
> Subject: Follow up call
>
> Marcus,
> Are you available around 2:30 this afternoon for a call? Presume you are not working Wednesday. If this afternoon doesn't work, how about Thursday morning or afternoon after 3:00? 15-20 minutes should be adequate.
> Thanks,
>
> Tom Dow
> VP Public Affairs
> Carnival North America LLC
> Washington, DC
>
> Sent from my iPad

Appointment

From: Magorrian, Matthew [Magorrian.Matthew@epa.gov]
Sent: 10/1/2015 7:31:18 PM
To: tdow@carnival.com; MKaczmarek@carnival.com; Samulski, Michael [samulski.michael@epa.gov]; Brown, Dan [Brown.Dan@epa.gov]; Zobrist, Marcus [Zobrist.Marcus@epa.gov]; Dunbar, Bill [dunbar.bill@epa.gov]

Subject: EPA/Carnival Call
Location: Ex. 6 Personal Privacy (PP)

Start: 10/7/2015 8:00:00 PM
End: 10/7/2015 8:30:00 PM
Show Time As: Tentative

Subj: Call between Carnival Cruise North America and EPA

Participants:
Tom Dow, VP Public Affairs – Carnival
Dennis McLerran, EPA
Mike Samulski, EPA
Marcus Zobrist, EPA
Dan Brown, EPA
Bill Dunbar (tentative), EPA

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 11/25/2015 5:32:36 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
Subject: Re: Call next week

Thanks.

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Wednesday, November 25, 2015 12:05 PM
To: Dow, Thomas (CarnCorp)
Cc: Emerson, Josh <Emerson.Josh@epa.gov>; Faulk, Jack <Faulk.Jack@epa.gov>
Subject: RE: Call next week

Tom,

I can do Wednesday at 4pm. Happy Thanksgiving.

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, November 25, 2015 11:41 AM
To: Zobrist, Marcus <Zobrist.Marcus@epa.gov>
Subject: Call next week

Marcus,
Are you available for a call next week to catch up on Carnival scrubber issues?Tuesday or Wednesday (Dec 1-2), morning or after 3pm either day.

I look forward to connecting.
Happy Thanksgiving.

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

Message

From: Zobrist, Marcus [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=844DEB75A43B4D319C6ADCAF8A5B2E4B-MZOBRIST]
Sent: 11/12/2015 3:01:53 PM
To: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Subject: RE: Follow up call

Sorry I missed your call. I'm in the office now.

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Thursday, November 12, 2015 10:00 AM
To: Zobrist, Marcus <Zobrist.Marcus@epa.gov>
Cc: Faulk, Jack <Faulk.Jack@epa.gov>
Subject: Re: Follow up call

Marcus
Just left voicemail. I'll try again in a few minutes. Let me know you need to reschedule.
Regards,

Tom Dow

Sent from my iPad

> On Nov 10, 2015, at 11:24 AM, Zobrist, Marcus <Zobrist.Marcus@epa.gov> wrote:
>
> Tom,
>
> I'm at a conference today and tomorrow (yup, I'm working on Veteran's Day). I could do Thursday at 10 AM. Would that work for you?
>
> _____
> From: Dow, Thomas (CarnCorp) <TDow@carnival.com>
> Sent: Tuesday, November 10, 2015 11:14 AM
> To: Zobrist, Marcus
> Subject: Follow up call
>
> Marcus,
> Are you available around 2:30 this afternoon for a call? Presume you are not working Wednesday. If this afternoon doesn't work, how about Thursday morning or afternoon after 3:00? 15-20 minutes should be adequate.
> Thanks,
>
> Tom Dow
> VP Public Affairs
> Carnival North America LLC
> Washington, DC
>
> Sent from my iPad

Message

From: Thomas Dow Ex. 6 Personal Privacy (PP)
Sent: 10/13/2017 8:20:08 PM
To: Faulk, Jack [Faulk.Jack@epa.gov]
CC: Zobrist, Marcus [Zobrist.Marcus@epa.gov]; Michael Kaczmarek [mkaczmarek@carnival.com]
Subject: Re: Carnival Meeting Oct. 24-25

Jack,
Sorry these dates down work. We'll get. Back with some times for a call.

Hope all goes well Ex. 6 Personal Privacy (PP)
Regards,

Tom

Sent from my iPhone

> On Oct 13, 2017, at 12:53 PM, Faulk, Jack <Faulk.Jack@epa.gov> wrote:
>
> Hi Tom,
>
> Those days don't work for me. Ex. 6 Personal Privacy (PP) and I'll be out both of those days. I checked Marcus' calendar and he is scheduled to be out of town most of that week too. Sorry. Maybe a phone call some other time may work.
>
> Jack
>
> -----Original Message-----
> From: Thomas Dow [mailto:2tomdow@gmail.com]
> Sent: Friday, October 13, 2017 11:08 AM
> To: Faulk, Jack <Faulk.Jack@epa.gov>; Zobrist, Marcus <Zobrist.Marcus@epa.gov>
> Cc: Michael Kaczmarek <mkaczmarek@carnival.com>
> Subject: Carnival Meeting Oct. 24-25
>
> Jack and Marcus,
> Mike Kaczmarek and I will be in Washington for a meeting the afternoon of Oct 24th. Are you available for an hour either the morning of Oct. 24 or the morning of Oct. 25?
>
> We could provide some preliminary results from the pH sampling program in Alaska in advance of the formal report.
>
> We hope this will work for you.
> Regards,
>
> Tom Dow
> Carnival Corporation
>
> Sent from my iPad

Message

From: Thomas Dow Ex. 6 Personal Privacy (PP)
Sent: 1/17/2018 5:00:05 PM
To: Faulk, Jack [Faulk.Jack@epa.gov]
CC: Zobrist, Marcus [Zobrist.Marcus@epa.gov]; Michael Kaczmarek [mkaczmarek@carnival.com]; JServidio@HollandAmericaGroup.com
Subject: Re: Carnival - EPA Update Meeting Feb 13

Thanks Jack.
We look forward to reconnecting with you and Marcus.
Regards,

Tom

Sent from my iPhone

> On Jan 17, 2018, at 7:40 AM, Faulk, Jack <Faulk.Jack@epa.gov> wrote:
>
> Hi Tom,
>
> It looks like 10-11 on February 13th works for us. I'll pencil you in for that time. Take care.
>
> Jack
>
>
> -----Original Message-----
> From: Thomas Dow Ex. 6 Personal Privacy (PP)
> Sent: Tuesday, January 16, 2018 9:01 PM
> To: Zobrist, Marcus <Zobrist.Marcus@epa.gov>
> Cc: Faulk, Jack <Faulk.Jack@epa.gov>; Michael Kaczmarek <mkaczmarek@carnival.com>; JServidio@HollandAmericaGroup.com
> Subject: Carnival - EPA Update Meeting Feb 13
>
> Marcus and Jack
> We can confirm Tuesday, February 13th.
>
> If mid morning works for you it allows travel flexibility for our group. How about 10:00?
>
> I look forward to seeing you again.
> Regards,
>
> Tom Dow
>
> Sent from my iPhone
>
>> On Jan 16, 2018, at 1:53 PM, Zobrist, Marcus <Zobrist.Marcus@epa.gov> wrote:
>>
>> Works for me.
>>
>> -----Original Message-----
>> From: Thomas Dow [mailto:2tomdow@gmail.com]
>> Sent: Tuesday, January 16, 2018 11:35 AM
>> To: Faulk, Jack <Faulk.Jack@epa.gov>
>> Cc: Zobrist, Marcus <Zobrist.Marcus@epa.gov>; Michael Kaczmarek <mkaczmarek@carnival.com>
>> Subject: Re: Carnival - EPA Update Meeting Request
>>
>> Thanks Jack. Looks like Feb. 13 is best for us.
>>
>> Marcus?
>> Tom
>>
>> Sent from my iPhone
>>
>>> On Jan 16, 2018, at 6:50 AM, Faulk, Jack <Faulk.Jack@epa.gov> wrote:
>>>
>>> Hi Tom,
>>>
>>> The 12th and 13th are both open for me and would be a better time to meet. Otherwise, Feb 1 works best for me. Hope all is well.
>>>
>>> Jack

>>> _____
>>> From: Thomas Dow Ex. 6 Personal Privacy (PP)
>>> Sent: Friday, January 12, 2018 6:30 PM
>>> To: Zobrist, Marcus
>>> Cc: Faulk, Jack; Michael Kaczmarek
>>> Subject: Re: Carnival - EPA Update Meeting Request
>>>
>>> Marcus
>>> Would Feb 12 or 13 be better? Jack?
>>>
>>> I can check with Mike
>>> Hope to see you soon.
>>> Tom
>>>
>>> Sent from my iPhone
>>>
>>>> On Jan 12, 2018, at 12:51 PM, Zobrist, Marcus <Zobrist.Marcus@epa.gov> wrote:
>>>>
>>>> Hi Tom,
>>>>
>>>> Would be interested in meeting with you and hearing updates on your EGCS system. I have a summons to jury duty starting on Jan 30, and am scheduled to be on travel the week of Feb 5 - so it might be just Jack to meet with you. Hope all is well.
>>>>
>>>> - Marcus
>>>>
>>>> -----Original Message-----
>>>> From: Thomas Dow Ex. 6 Personal Privacy (PP)
>>>> Sent: Friday, January 12, 2018 12:54 PM
>>>> To: Faulk, Jack <Faulk.Jack@epa.gov>; Zobrist, Marcus <Zobrist.Marcus@epa.gov>
>>>> Cc: Michael Kaczmarek <mkaczmarek@carnival.com>
>>>> Subject: Carnival - EPA Update Meeting Request
>>>>
>>>> Jack and Marcus,
>>>> Happy New Year. I hope you are both well and getting a start on 2018.
>>>>
>>>> Mike and I are planning to visit Washington in a few weeks for several meetings and would be grateful for a chance to meet with you for an hour to update you on developments with the Exhaust Gas Cleaning System (EGCS) project.
>>>>
>>>> Would you be available January 30,31, or February 1st? Alternatively, the following week, February 5-9? We can schedule around your availability.
>>>> Thanks and regards,
>>>>
>>>> Tom Dow
>>>> Carnival Corporation
>>>>
>>>>
>>>> Sent from my iPad

Message

From: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Sent: 11/15/2018 11:19:34 PM
To: Faulk, Jack [Faulk.Jack@epa.gov]; Thomas Dow Ex. 6 Personal Privacy (PP); Zobrist, Marcus [Zobrist.Marcus@epa.gov]
Subject: RE: Baltimore Ship Tour

Great!

From: Faulk, Jack [mailto:Faulk.Jack@epa.gov]
Sent: Thursday, November 15, 2018 4:12 PM
To: Thomas Dow; Zobrist, Marcus
Cc: Kaczmarek, Michael (CarnCorp)
Subject: Re: Baltimore Ship Tour

Hi Tom,

I'm interested. I spoke with Nina a bit today and she said she would check with folks here early next week and get back to you then.

Hope you are avoiding the fires in California. What a terrible situation. Take care.

Jack

From: Thomas Dow Ex. 6 Personal Privacy (PP)
Sent: Wednesday, November 14, 2018 4:28 PM
To: Faulk, Jack; Zobrist, Marcus
Cc: Michael Kaczmarek
Subject: Baltimore Ship Tour

Jack and Marcus,
Mike Kaczmarek attended the Green Ship conference in NY this week and had a chance to connect with Nina.

The subject of a tour of a ship in Baltimore came up and we wondered if the two of you would be interested in this.

Best date, considering Holidays, is Sunday, December 9th. Mike and I need to be in Washington for other meetings around that week.

Let me know if it works for you.
Thanks and regards,

Tom Dow
Carnival Corporation

Sent from my iPhone

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 7/20/2016 2:45:50 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
Subject: RE: Baltimore Ship Tour July 24

Marcus,
Sorry to miss you this time, but I understand. We will keep you on the list for a future ship tour.
Regards,

Tom

-----Original Message-----
From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Wednesday, July 20, 2016 10:22 AM
To: Dow, Thomas (CarnCorp); Faulk, Jack
Cc: Emerson, Josh; Kaczmarek, Michael (CarnCorp)
Subject: RE: Baltimore Ship Tour July 24

Tom,

Unfortunately, I will not be able to join you, as much as I want to. We have out of town guests in on Sunday who are only available for brunch. Jack and Josh - I look forward to the full report!

- Marcus

Marcus Zobrist
Acting Director, Oceans & Coastal Protection Division Office of Oceans, Wetlands and Watersheds |Office of Water U.S. Environmental Protection
(202) 564-8311 | Zobrist.Marcus@epa.gov

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-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, July 20, 2016 9:36 AM
To: Faulk, Jack <Faulk.Jack@epa.gov>
Cc: Zobrist, Marcus <Zobrist.Marcus@epa.gov>; Emerson, Josh <Emerson.Josh@epa.gov>; Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>
Subject: RE: Baltimore Ship Tour July 24

Jack and Josh,
I need the following information from you to secure visitor passes from the ship security staff:

Full Name as it appears on Driver's License or Passport Date of Birth Driver's License or Passport number and expiration date Citizenship

I will revert with specific time to meet at the Cruise Terminal in Baltimore. We are shooting for boarding at 10:30-11:00 am. We expect to finish the tour by 2-2:30pm. I will confirm these times Friday.

Marcus, I am presuming you are unable to join us, but if you can do so I want you to know you are most welcome.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

-----Original Message-----
From: Faulk, Jack [mailto:Faulk.Jack@epa.gov]
Sent: Friday, July 08, 2016 1:30 PM
To: Dow, Thomas (CarnCorp)
Cc: Zobrist, Marcus; Emerson, Josh; Kaczmarek, Michael (CarnCorp)

Subject: RE: Baltimore Ship Tour July 24

Hi Tom,

Josh and I are available for the tour. Juhi is not but she (i.e., the attorney) is ok with us going without her. I'll let Marcus respond directly whether he's interested/available in his new role in one of our sister divisions in the Office of Water. Thanks.

Jack

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, July 08, 2016 12:00 PM
To: Faulk, Jack <Faulk.Jack@epa.gov>; Saxena, Juhi <Saxena.Juhi@epa.gov>
Cc: Emerson, Josh <Emerson.Josh@epa.gov>; Zobrist, Marcus <Zobrist.Marcus@epa.gov>; Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>
Subject: Baltimore Ship Tour July 24

Jack and Juhi,
This is follow up to confirm your availability for a briefing and tour of the Exhaust Gas Cleaning System on Carnival Pride. The ship is in Baltimore Sunday, July 24th.

Please confirm if this still works and we can finalize schedule and other details.

Marcus is in copy in case he is available to join us.
Regards,

Tom Dow
VP, Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

On Jun 3, 2016, at 11:16 AM, Zobrist, Marcus <Zobrist.Marcus@epa.gov<mailto:Zobrist.Marcus@epa.gov>> wrote:

Hi Tom and Mike,

Just letting you know that I am transitioning to a new position for the next year.

Ms. Juhi Saxena will be the Acting Chief of the Industrial Branch, starting on Monday, June 6th. She will serve in this role for the month of June while a longer term replacement is selected. For all VGP issues, please continue to work with Jack Faulk and Josh Emerson and Juhi as well.

At our last meeting we discussed the various air quality benefits that the operation of your scrubbers provide. Subsequent to that meeting, I discussed this with Michael Samulski, Director, Large Marine and Aircraft Center, Office of Transportation and Air Quality and his staff. He and his staff were very interested in understanding those benefits better than I could explain them. I would suggest that you may want to consider working with Jack to possibly set up an informational meeting or conference call with OTEC, OW and possibly EPA R10 office to better discuss these benefits.

As you know, Juhi, Jack and Josh will be working on developing a draft of the next VGP. I also suggest that you continue to work with them to make sure they have a good understanding of the non-water quality benefits of your scrubbers, as this may be something they could consider in drafting EGS wastewater limits.

Stating on Monday, I'll be attending the Federal Executive Institute in Charlottesville, Va. for a month long training. Directly thereafter, on July 5th, I begin an 11 month assignment as the Acting Director of the Oceans and Coastal Protection Division in EPA.

I look forward to working with you again next year on VGP issues, and maybe I'll have a chance to work with you in the interim in my new role on vessel sewage and/or ocean issues.

Marcus

Marcus Zobrist | U.S. Environmental Protection Agency Chief, Industrial Branch | (202) 564-8311 Water Permits Division |Office of Wastewater Management

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Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 4/21/2016 6:21:00 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Faulk, Jack [Faulk.Jack@epa.gov]; Emerson, Josh [Emerson.Josh@epa.gov]; Saxena, Juhi [Saxena.Juhi@epa.gov]
Subject: RE: Ship tour in Baltimore RESCHEDULE

Thanks, Marcus.
We will recheck July 24th on our end and revert.
Regards,

Tom Dow

From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Thursday, April 21, 2016 2:20 PM
To: Dow, Thomas (CarnCorp)
Cc: Kaczmarek, Michael (CarnCorp); Faulk, Jack; Emerson, Josh; Saxena, Juhi
Subject: Re: Ship tour in Baltimore RESCHEDULE

Tom,

I'm July 24th would work for me, the 31st does not. Thanks for checking.

Sent from my iPhone

On Apr 21, 2016, at 8:57 AM, Dow, Thomas (CarnCorp) <TDow@carnival.com> wrote:

> Marcus,
> Would either July 24th or July 31st work for your group?
> Tom
>
> ---
>
> **From:** Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
> **Sent:** Wednesday, April 20, 2016 4:13 PM
> **To:** Dow, Thomas (CarnCorp); Kaczmarek, Michael (CarnCorp)
> **Cc:** Faulk, Jack; Emerson, Josh; Saxena, Juhi
> **Subject:** RE: Ship tour in Baltimore RESCHEDULE
>
> Tom,
>
> Got it. June 12th does not work for me – I'll be in a work training that runs is in session that weekend, so it definitely out. Are there times in July that you could propose?
>
> ---
>
> **From:** Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
> **Sent:** Wednesday, April 20, 2016 10:34 AM
> **To:** Zobrist, Marcus <Zobrist.Marcus@epa.gov>; Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>
> **Cc:** Faulk, Jack <Faulk.Jack@epa.gov>; Emerson, Josh <Emerson.Josh@epa.gov>; Saxena, Juhi <Saxena.Juhi@epa.gov>
> **Subject:** Ship tour in Baltimore RESCHEDULE
>
> Marcus,

We have learned that Carnival Pride would prefer to delay the visit because of work on the EGCS/Scrubber Towers being undertaken while the ship is in Port.

The next best date for us is June 12th. If this does not work for you, we will look for another date later in the summer. Thanks for your flexibility and we will work to make this happen.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Monday, April 11, 2016 12:42 PM
To: Dow, Thomas (CarnCorp); Kaczmarek, Michael (CarnCorp)
Subject: Ship tour in Baltimore

Hi Tom.

Scheduling the ship tour in Baltimore, Sunday May 8th would work for Jack, Josh and I. While this tour would be fascinating and very informative for us at EPA, it is certainly not urgent. We could also look to dates in July or after as well. If there is a another date that works well with your schedules, and by that I mean not making a special trip, I would suggest we do that.

- Marcus

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 4/20/2016 8:22:51 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
CC: Faulk, Jack [Faulk.Jack@epa.gov]; Emerson, Josh [Emerson.Josh@epa.gov]; Saxena, Juhi [Saxena.Juhi@epa.gov]
Subject: Re: Ship tour in Baltimore RESCHEDULE

Marcus
I will check and revert.
Tom

Sent from Tom Dow's Blackberry

From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Wednesday, April 20, 2016 04:13 PM
To: Dow, Thomas (CarnCorp); Kaczmarek, Michael (CarnCorp)
Cc: Faulk, Jack <Faulk.Jack@epa.gov>; Emerson, Josh <Emerson.Josh@epa.gov>; Saxena, Juhi <Saxena.Juhi@epa.gov>
Subject: RE: Ship tour in Baltimore RESCHEDULE

Tom,

Got it. June 12th does not work for me – I'll be in a work training that runs is in session that weekend, so it definitely out. Are there times in July that you could propose?

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Sent: Wednesday, April 20, 2016 10:34 AM
To: Zobrist, Marcus <Zobrist.Marcus@epa.gov>; Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>
Cc: Faulk, Jack <Faulk.Jack@epa.gov>; Emerson, Josh <Emerson.Josh@epa.gov>; Saxena, Juhi <Saxena.Juhi@epa.gov>
Subject: Ship tour in Baltimore RESCHEDULE

Marcus,
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Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Monday, April 11, 2016 12:42 PM
To: Dow, Thomas (CarnCorp); Kaczmarek, Michael (CarnCorp)
Subject: Ship tour in Baltimore

Hi Tom.

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- Marcus

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, April 08, 2016 11:10 AM
To: Zobrist, Marcus <Zobrist.Marcus@epa.gov>; Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>
Cc: Faulk, Jack <Faulk.Jack@epa.gov>; Saxena, Juhi <Saxena.Juhi@epa.gov>; Emerson, Josh <Emerson.Josh@epa.gov>; VGP <VGP@epa.gov>
Subject: Re: VGP's requirements for reporting of pH monitoring results

Marcus,
Thank you for meeting with us today and for the clarification of VGP reporting requirements.

We look forward to scheduling a Baltimore ship tour in May.
Regards,

Tom Dow

Sent from Tom Dow's Blackberry

From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Friday, April 08, 2016 09:57 AM
To: Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp)
Cc: Faulk, Jack <Faulk.Jack@epa.gov>; Saxena, Juhi <Saxena.Juhi@epa.gov>; Emerson, Josh <Emerson.Josh@epa.gov>; VGP <VGP@epa.gov>
Subject: VGP's requirements for reporting of pH monitoring results

Tom and Mike,

In a recent meeting, you asked the following question relating to the 2013 VGP's requirements for reporting of pH monitoring results.

Question

How does the 2013 VGP's 24-hour notification requirements apply to noncompliance with exhaust gas scrubber washwater pH limits?

Answer

Section 4.4.4 of the 2013 VGP requires 24-hour reporting to the EPA Region of any "noncompliance which may endanger health or the environment." In addition, section 1.13 of the 2013 VGP incorporates by reference the standard conditions in 40 CFR §122.41.

As it applies to noncompliance with pH limits for exhaust gas scrubber washwater discharges, 24-hour reporting is only applicable if the pollutant is specifically identified in the permit as requiring 24 hour reporting. Since the permit does not specifically call out this requirement for pH, such reporting is not required.

Marcus Zobrist | U.S. Environmental Protection Agency
Chief, Industrial Branch | (202) 564-8311

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 4/11/2016 4:47:15 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Subject: RE: Ship tour in Baltimore

Thanks, Marcus.
I will check with our group and get back.
Regards,

Tom Dow

From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Monday, April 11, 2016 12:42 PM
To: Dow, Thomas (CarnCorp); Kaczmarek, Michael (CarnCorp)
Subject: Ship tour in Baltimore

Hi Tom.

Scheduling the ship tour in Baltimore, Sunday May 8th would work for Jack, Josh and I. While this tour would be fascinating and very informative for us at EPA, it is certainly not urgent. We could also look to dates in July or after as well. If there is a another date that works well with your schedules, and by that I mean not making a special trip, I would suggest we do that.

- Marcus

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, April 08, 2016 11:10 AM
To: Zobrist, Marcus <Zobrist.Marcus@epa.gov>; Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>
Cc: Faulk, Jack <Faulk.Jack@epa.gov>; Saxena, Juhi <Saxena.Juhi@epa.gov>; Emerson, Josh <Emerson.Josh@epa.gov>; VGP <VGP@epa.gov>
Subject: Re: VGP's requirements for reporting of pH monitoring results

Marcus,
Thank you for meeting with us today and for the clarification of VGP reporting requirements.

We look forward to scheduling a Baltimore ship tour in May.
Regards,

Tom Dow

Sent from Tom Dow's Blackberry

From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Friday, April 08, 2016 09:57 AM
To: Kaczmarek, Michael (CarnCorp); Dow, Thomas (CarnCorp)
Cc: Faulk, Jack <Faulk.Jack@epa.gov>; Saxena, Juhi <Saxena.Juhi@epa.gov>; Emerson, Josh <Emerson.Josh@epa.gov>; VGP <VGP@epa.gov>
Subject: VGP's requirements for reporting of pH monitoring results

Tom and Mike,

In a recent meeting, you asked the following question relating to the 2013 VGP's requirements for reporting of pH monitoring results.

Question

How does the 2013 VGP's 24-hour notification requirements apply to noncompliance with exhaust gas scrubber washwater pH limits?

Answer

Section 4.4.4 of the 2013 VGP requires 24-hour reporting to the EPA Region of any "noncompliance which may endanger health or the environment." In addition, section 1.13 of the 2013 VGP incorporates by reference the standard conditions in 40 CFR §122.41.

As it applies to noncompliance with pH limits for exhaust gas scrubber washwater discharges, 24-hour reporting is only applicable if the pollutant is specifically identified in the permit as requiring 24 hour reporting. Since the permit does not specifically call out this requirement for pH, such reporting is not required.

Marcus Zobrist | U.S. Environmental Protection Agency
Chief, Industrial Branch | (202) 564-8311
Water Permits Division | Office of Wastewater Management

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 4/8/2016 1:47:48 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
Subject: Downstairs

Marcus
We are through security. East Bldg same entrance as last time.
Thanks,

Tom

Sent from Tom Dow's Blackberry

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 4/5/2016 11:26:10 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
CC: Faulk, Jack [Faulk.Jack@epa.gov]
Subject: Re: VGP Section 4.4.4

Marcus,
10am Friday works for us. Mike and I will be at security by 09:45.
We'll make it within one hour or less.
Thanks,

Tom Dow

Sent from my iPad

On Apr 5, 2016, at 7:13 PM, Zobrist, Marcus <Zobrist.Marcus@epa.gov<mailto:Zobrist.Marcus@epa.gov>> wrote:

Tom,

Sorry for the delay getting back to you. Would 10 am work? I do have to keep this to an hour or less. Friday will be my first day back in the office in two weeks.

Sent from my iPhone

On Apr 5, 2016, at 12:56 PM, Dow, Thomas (CarnCorp) <TDow@carnival.com<mailto:TDow@carnival.com>> wrote:

Marcus and Jack,
Following up on the email below, any chance of a one-hour meeting Friday morning while Mike Kaczmarek is in Washington?
Thanks,

Tom Dow

From: Dow, Thomas (CarnCorp)
Sent: Friday, April 01, 2016 1:47 PM
To: Zobrist, Marcus (Zobrist.Marcus@epa.gov<mailto:Zobrist.Marcus@epa.gov>); Faulk, Jack (Faulk.Jack@epa.gov<mailto:Faulk.Jack@epa.gov>)
Subject: FW: VGP Section 4.4.4

Marcus and Jack,
Mike Kaczmarek will be in Washington next Friday, April 8th. Would you be available for a meeting in the morning, say 10:00? One hour or less. We have other meetings in the afternoon, but anytime in the morning could work for us. Purpose would be follow up on VGP issues.
Thanks and regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC
202.347.7150 Office
202.538.0431 Cell

From: Dow, Thomas (CarnCorp)
Sent: Friday, March 25, 2016 9:58 AM
To: Zobrist, Marcus (Zobrist.Marcus@epa.gov<mailto:Zobrist.Marcus@epa.gov>); Faulk, Jack (Faulk.Jack@epa.gov<mailto:Faulk.Jack@epa.gov>)
Subject: VGP Section 4.4.4

Marcus and Jack,
This is a gentle reminder that we would be grateful for clarification regarding 24 hour reporting of EGCS Open Loop Scrubber washwater that is not compliant with VGP pH limits. Attached for reference is Section 4.4.4. We discussed the issue of pH variances fitting the intent of, "noncompliance which may endanger health or the environment."

Thank you for considering this issue.
Regards,

Tom Dow

VP Public Affairs
Carnival North America LLC
Washington, DC

<2331_001.pdf>

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 6/3/2016 6:27:55 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Faulk, Jack [Faulk.Jack@epa.gov]; Emerson, Josh [Emerson.Josh@epa.gov]; Saxena, Juhi [Saxena.Juhi@epa.gov]; McLerran, Dennis [mclerran.dennis@epa.gov]
Subject: Re: New contact for VGP

Marcus,
Congratulations on your new position. We appreciate having the chance to work with you and will follow up with Jack and Juhi Saxena. We wish you all the best in your new role.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

On Jun 3, 2016, at 11:16 AM, Zobrist, Marcus <Zobrist.Marcus@epa.gov<mailto:Zobrist.Marcus@epa.gov>> wrote:

Hi Tom and Mike,

Just letting you know that I am transitioning to a new position for the next year.

Ms. Juhi Saxena will be the Acting Chief of the Industrial Branch, starting on Monday, June 6th. She will serve in this role for the month of June while a longer term replacement is selected. For all VGP issues, please continue to work with Jack Faulk and Josh Emerson and Juhi as well.

At our last meeting we discussed the various air quality benefits that the operation of your scrubbers provide. Subsequent to that meeting, I discussed this with Michael Samulski, Director, Large Marine and Aircraft Center, Office of Transportation and Air Quality and his staff. He and his staff were very interested in understanding those benefits better than I could explain them. I would suggest that you may want to consider working with Jack to possibly set up an informational meeting or conference call with OTEC, OW and possibly EPA R10 office to better discuss these benefits.

As you know, Juhi, Jack and Josh will be working on developing a draft of the next VGP. I also suggest that you continue to work with them to make sure they have a good understanding of the non-water quality benefits of your scrubbers, as this may be something they could consider in drafting EGS wastewater limits.

Stating on Monday, I'll be attending the Federal Executive Institute in Charlottesville, Va. for a month long training. Directly thereafter, on July 5th, I begin an 11 month assignment as the Acting Director of the Oceans and Coastal Protection Division in EPA.

I look forward to working with you again next year on VGP issues, and maybe I'll have a chance to work with you in the interim in my new role on vessel sewage and/or ocean issues.

Marcus

Marcus Zobrist | U.S. Environmental Protection Agency
Chief, Industrial Branch | (202) 564-8311
Water Permits Division |Office of Wastewater Management

This e-mail is intended solely for the use of the individual or entity to whom it is addressed and its content shall be regarded as confidential unless explicitly stated otherwise. If you have received this e-mail
by mistake, please notify the sender immediately by e-mail and delete this e-mail from your system.

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 3/25/2016 1:57:33 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]; Faulk, Jack [Faulk.Jack@epa.gov]
Subject: VGP Section 4.4.4
Attachments: 2331_001.pdf

Marcus and Jack,
This is a gentle reminder that we would be grateful for clarification regarding 24 hour reporting of EGCS Open Loop Scrubber washwater that is not compliant with VGP pH limits. Attached for reference is Section 4.4.4. We discussed the issue of pH variances fitting the intent of, "noncompliance which may endanger health or the environment."

Thank you for considering this issue.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 3/2/2016 3:28:07 PM
To: Zobrist, Marcus [Zobrist.Marcus@epa.gov]
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Emerson, Josh [Emerson.Josh@epa.gov]; Faulk, Jack [Faulk.Jack@epa.gov]
Subject: Re: Follow up request - Carnival EGCS Water Discharge Update

Marcus,
Any chance we could meet Thursday afternoon?
Thanks,

Tom

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Wednesday, March 02, 2016 09:26 AM
To: Dow, Thomas (CarnCorp)
Cc: Kaczmarek, Michael (CarnCorp); Emerson, Josh <Emerson.Josh@epa.gov>; Faulk, Jack <Faulk.Jack@epa.gov>
Subject: RE: Follow up request - Carnival EGCS Water Discharge Update

Tom,

My apologies for not responding to your earlier email. I lost it in my inbox. Would Thursday March 10 at 10 am work for you?

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Tuesday, March 01, 2016 6:44 PM
To: Zobrist, Marcus <Zobrist.Marcus@epa.gov>
Cc: Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>
Subject: Follow up request - Carnival EGCS Water Discharge Update

Marcus,
This is a gentle follow up on the earlier request. We would be grateful of you could be available to meet March 7, 9, 10, or 11. March 8 is no longer good for us. Any time after noon. As noted below, 90 minutes would be ideal, but we could make 60 or 75 minutes work.

We can plan a Sunday ship tour in Baltimore at a later date.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

Begin forwarded message:

From: "Dow, Thomas (CarnCorp)" <TDow@carnival.com<mailto:TDow@carnival.com>>
Date: February 18, 2016 at 1:56:26 PM PST
To: "Zobrist, Marcus (Zobrist.Marcus@epa.gov<mailto:Zobrist.Marcus@epa.gov>)"
<Zobrist.Marcus@epa.gov<mailto:Zobrist.Marcus@epa.gov>>
Subject: Carnival EGCS Water Discharge Update

Marcus,
Hope you are well and survived both snow storms.

Mike Kaczmarek and I would like a follow up meeting to update you on our efforts regarding washwater discharge from open loop exhaust gas scrubbers. We would like to propose either March 8 or March 9, early afternoon in your offices. Probably 90 minutes would be ideal.

Alternatively, we could schedule a briefing and ship tour in Baltimore, but this would need to be late March or April. Carnival Breeze is in Baltimore on Sundays.

Or, we could have the meeting in your office and work on a ship visit at a later date. Please advise of your availability and preference.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Zobrist, Marcus [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=844DEB75A43B4D319C6ADCAF8A5B2E4B-MZOBRIST]
Sent: 1/16/2018 9:53:32 PM
To: Thomas Dow [Ex. 6 Personal Privacy (PP)]; Faulk, Jack [Faulk.Jack@epa.gov]
CC: Michael Kaczmarek [mkaczmarek@carnival.com]
Subject: RE: Carnival - EPA Update Meeting Request

Works for me.

-----Original Message-----
From: Thomas Dow [Ex. 6 Personal Privacy (PP)]
Sent: Tuesday, January 16, 2018 11:35 AM
To: Faulk, Jack <Faulk.Jack@epa.gov>
Cc: Zobrist, Marcus <Zobrist.Marcus@epa.gov>; Michael Kaczmarek <mkaczmarek@carnival.com>
Subject: Re: Carnival - EPA Update Meeting Request

Thanks Jack. Looks like Feb. 13 is best for us.

Marcus?
Tom

Sent from my iPhone

> On Jan 16, 2018, at 6:50 AM, Faulk, Jack <Faulk.Jack@epa.gov> wrote:
>
> Hi Tom,
>
> The 12th and 13th are both open for me and would be a better time to meet. Otherwise, Feb 1 works best for me. Hope all is well.
>
> Jack
> _____
> From: Thomas Dow [Ex. 6 Personal Privacy (PP)]
> Sent: Friday, January 12, 2018 6:30 PM
> To: Zobrist, Marcus
> Cc: Faulk, Jack; Michael Kaczmarek
> Subject: Re: Carnival - EPA Update Meeting Request
>
> Marcus
> Would Feb 12 or 13 be better? Jack?
>
> I can check with Mike
> Hope to see you soon.
> Tom
>
> Sent from my iPhone
>
>> On Jan 12, 2018, at 12:51 PM, Zobrist, Marcus <Zobrist.Marcus@epa.gov> wrote:
>>
>> Hi Tom,
>>
>> Would be interested in meeting with you and hearing updates on your EGCS system. I have a summons to jury duty starting on Jan 30, and am scheduled to be on travel the week of Feb 5 - so it might be just Jack to meet with you. Hope all is well.
>>
>> - Marcus
>>
>> -----Original Message-----
>> From: Thomas Dow [Ex. 6 Personal Privacy (PP)]
>> Sent: Friday, January 12, 2018 12:54 PM
>> To: Faulk, Jack <Faulk.Jack@epa.gov>; Zobrist, Marcus <Zobrist.Marcus@epa.gov>
>> Cc: Michael Kaczmarek <mkaczmarek@carnival.com>
>> Subject: Carnival - EPA Update Meeting Request
>>
>> Jack and Marcus,
>> Happy New Year. I hope you are both well and getting a start on 2018.
>>
>> Mike and I are planning to visit Washington in a few weeks for several meetings and would be grateful for a chance to meet with you for an hour to update you on developments with the Exhaust Gas Cleaning System (EGCS) project.

>>
>> Would you be available January 30,31, or February 1st? Alternatively, the following week, February 5-9? We can schedule around your availability.
>> Thanks and regards,
>>
>> Tom Dow
>> Carnival Corporation
>>
>>
>> Sent from my iPad

Message

From: Zobrist, Marcus [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=844DEB75A43B4D319C6ADCAF8A5B2E4B-MZOBRIST]
Sent: 4/8/2016 1:57:23 PM
To: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Dow, Thomas (CarnCorp) [TDow@carnival.com]
CC: Jack Faulk (Faulk.Jack@epa.gov) [Faulk.Jack@epa.gov]; Saxena, Juhi [Saxena.Juhi@epa.gov]; Emerson, Josh [Emerson.Josh@epa.gov]; VGP [VGP@epa.gov]
Subject: VGP's requirements for reporting of pH monitoring results

Tom and Mike,

In a recent meeting, you asked the following question relating to the 2013 VGP's requirements for reporting of pH monitoring results.

Question

How does the 2013 VGP's 24-hour notification requirements apply to noncompliance with exhaust gas scrubber washwater pH limits?

Answer

Section 4.4.4 of the 2013 VGP requires 24-hour reporting to the EPA Region of any "noncompliance which may endanger health or the environment." In addition, section 1.13 of the 2013 VGP incorporates by reference the standard conditions in 40 CFR §122.41.

As it applies to noncompliance with pH limits for exhaust gas scrubber washwater discharges, 24-hour reporting is only applicable if the pollutant is specifically identified in the permit as requiring 24 hour reporting. Since the permit does not specifically call out this requirement for pH, such reporting is not required.

Marcus Zobrist | U.S. Environmental Protection Agency
Chief, Industrial Branch | (202) 564-8311
Water Permits Division | Office of Wastewater Management

Message

From: Zobrist, Marcus [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=844DEB75A43B4D319C6ADCAF8A5B2E4B-MZOBRIST]
Sent: 3/4/2016 6:56:20 PM
To: Dow, Thomas (CarnCorp) [TDow@carnival.com]
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Emerson, Josh [Emerson.Josh@epa.gov]; Faulk, Jack [Faulk.Jack@epa.gov]; Santiesteban, Marilyn (CarnCorp) [MSantiesteban@carnival.com]
Subject: RE: Follow up request - Carnival EGCS Water Discharge Update

Great. Looking forward to seeing you next week.

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, March 04, 2016 1:07 PM
To: Zobrist, Marcus <Zobrist.Marcus@epa.gov>
Cc: Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>; Emerson, Josh <Emerson.Josh@epa.gov>; Faulk, Jack <Faulk.Jack@epa.gov>; Santiesteban, Marilyn (CarnCorp) <MSantiesteban@carnival.com>
Subject: RE: Follow up request - Carnival EGCS Water Discharge Update

Marcus,
We can confirm 10:00 am Thursday, March 10. We will be at the security desk by 09:45. Mike Kaczmarek and I will attend.
We look forward to the meeting.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

-----Original Message-----
From: Zobrist, Marcus [mailto:Zobrist.Marcus@epa.gov]
Sent: Wednesday, March 02, 2016 9:26 AM
To: Dow, Thomas (CarnCorp)
Cc: Kaczmarek, Michael (CarnCorp); Emerson, Josh; Faulk, Jack
Subject: RE: Follow up request - Carnival EGCS Water Discharge Update

Tom,

My apologies for not responding to your earlier email. I lost it in my inbox. Would Thursday March 10 at 10 am work for you?

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Tuesday, March 01, 2016 6:44 PM
To: Zobrist, Marcus <Zobrist.Marcus@epa.gov>
Cc: Kaczmarek, Michael (CarnCorp) <MKaczmarek@carnival.com>
Subject: Follow up request - Carnival EGCS Water Discharge Update

Marcus,
This is a gentle follow up on the earlier request. We would be grateful of you could be available to meet March 7, 9, 10, or 11. March 8 is no longer good for us. Any time after noon. As noted below, 90 minutes would be ideal, but we could make 60 or 75 minutes work.

We can plan a Sunday ship tour in Baltimore at a later date.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

Begin forwarded message:

From: "Dow, Thomas (CarnCorp)" <TDow@carnival.com<mailto:TDow@carnival.com>>
Date: February 18, 2016 at 1:56:26 PM PST
To: "Zobrist, Marcus (Zobrist.Marcus@epa.gov<mailto:Zobrist.Marcus@epa.gov>)"
<Zobrist.Marcus@epa.gov<mailto:Zobrist.Marcus@epa.gov>>

Subject: Carnival EGCS Water Discharge Update

Marcus,
Hope you are well and survived both snow storms.

Mike Kaczmarek and I would like a follow up meeting to update you on our efforts regarding washwater discharge from open loop exhaust gas scrubbers. We would like to propose either March 8 or March 9, early afternoon in your offices. Probably 90 minutes would be ideal.

Alternatively, we could schedule a briefing and ship tour in Baltimore, but this would need to be late March or April. Carnival Breeze is in Baltimore on Sundays.

Or, we could have the meeting in your office and work on a ship visit at a later date. Please advise of your availability and preference.
Regards,

Tom Dow
VP Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 3/11/2013 7:33:32 PM
To: McLerran, Dennis [mclerran.dennis@epa.gov]
CC: Albright, Rick [Albright.Rick@epa.gov]; Brown, Dan [Brown.Dan@epa.gov]; Magorrian, Matthew [Magorrian.Matthew@epa.gov]
Subject: Re: ECA Update

Dennis.
Would Thursday work. I will be in Miami but can accommodate most any time. 30 minutes should be adequate.

If Thursday does not work I will be back in DC next week.

I look forward to catching up.
Regards.

Tom

Sent from Tom Dow's Blackberry

From: McLerran, Dennis [mailto:mclerran.dennis@epa.gov]
Sent: Monday, March 11, 2013 11:03 AM
To: Dow, Thomas (CarnCorp)
Cc: Albright, Rick <Albright.Rick@epa.gov>; Brown, Dan <Brown.Dan@epa.gov>; Magorrian, Matthew <Magorrian.Matthew@epa.gov>
Subject: RE: ECA Update

Tom:

It's good to hear from you. I'm excited to hear more about Carnival's plans. I did talk with Bill Charmley and he had very positive things to say about the meeting you had a couple of weeks ago. I am very interested in continuing to see if I can help facilitate a good solution for Carnival and for EPA on this. Let me know some times when you would be available for a call and I'll ask Matt on my staff to set some time up to talk.

Dennis

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, March 08, 2013 1:43 PM
To: McLerran, Dennis
Subject: ECA Update

Dennis,
I hope you are well.

You may have heard that Carnival Corporation has had initial discussions with Bill Charmley and others at EPA and USCG regarding a MARPOL Regulation 3 Exemption for technology R&D. We are proposing an aggressive scrubber development and installation program. This would apply to Carnival, Princess, Holland America, Cunard and other ships operating in the North American ECA.

This approach was partially a result of my discussions with you, and subsequently with Chris Grundler regarding a technology-based approach rather than population-weighted averaging.

We believe we have a promising technology that will offer added benefits beyond sulfur reduction. Our proposal would include shorepower and other initiatives.

I would be grateful for an opportunity to discuss this further with you. I'm in DC today and Saturday, then in Miami for the Cruise Shipping Miami Conference next week, but will have email and cell.

Below is my contact information.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

202.347.7150 Office
202.538.0431 Cell

Message

From: McLerran, Dennis [mclerran.dennis@epa.gov]
Sent: 3/11/2013 3:03:03 PM
To: tdow@carnival.com
CC: Albright, Rick [Albright.Rick@epa.gov]; Brown, Dan [Brown.Dan@epa.gov]; Magorrian, Matthew [Magorrian.Matthew@epa.gov]
Subject: RE: ECA Update

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Dennis

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Sent: Friday, March 08, 2013 1:43 PM
To: McLerran, Dennis
Subject: ECA Update

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Below is my contact information.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

202.347.7150 Office
202.538.0431 Cell

Message

From: Brake, Aubrie (CarnCorp) [ABrake@carnival.com]
Sent: 10/6/2015 9:08:32 PM
To: McLerran, Dennis [mclerran.dennis@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; Brown, Dan [Brown.Dan@epa.gov]; Zobrist, Marcus [Zobrist.Marcus@epa.gov]; Dunbar, Bill [dunbar.bill@epa.gov]
CC: tdow@carnival.com; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Tombolesi, Emilio (CarnCorp) [ETombolesi@carnival.com]
Subject: Documents for EPA/Carnival call tomorrow
Attachments: Washwater Results Seattle Visit.pdf; EGCS washwater results_Updated_9.22.15.pdf; Zuiderdam Sample Compliance Computer Report_Confidential.pdf

Good Afternoon All,
Hope this email finds you well.
Attached are three documents for the call tomorrow.

1. Washwater Results Seattle Visit:
    a. Chart detailing washwater test results (was included in presentation during the ship tour in Seattle)

2. EGCS washwater results Updated 9.22.15:
    a. Updated version of the washwater test results chart currently being used in EU discussions. It includes an average of 41 samples from 18 ships.

3. Zuiderdam Sample Compliance Computer Report:
    a. Sample onboard Compliance Computer summary data from Holland America Line's Zuiderdam

We look forward to speaking with you soon.
Sincerely,

Aubrie Brake
Manager – Environmental Policy| Carnival Corporation & plc | 3655 N.W. 87th Avenue | Miami, FL 33178 | 305-599-2600 x19015 | 786-205-3177 | abrake@carnival.com

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 3/11/2013 7:33:32 PM
To: McLerran, Dennis [mclerran.dennis@epa.gov]
CC: Albright, Rick [Albright.Rick@epa.gov]; Brown, Dan [Brown.Dan@epa.gov]; Magorrian, Matthew [Magorrian.Matthew@epa.gov]
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Tom

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Sent: Monday, March 11, 2013 11:03 AM
To: Dow, Thomas (CarnCorp)
Cc: Albright, Rick <Albright.Rick@epa.gov>; Brown, Dan <Brown.Dan@epa.gov>; Magorrian, Matthew <Magorrian.Matthew@epa.gov>
Subject: RE: ECA Update

Tom:

It's good to hear from you. I'm excited to hear more about Carnival's plans. I did talk with Bill Charmley and he had very positive things to say about the meeting you had a couple of weeks ago. I am very interested in continuing to see if I can help facilitate a good solution for Carnival and for EPA on this. Let me know some times when you would be available for a call and I'll ask Matt on my staff to set some time up to talk.

Dennis

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, March 08, 2013 1:43 PM
To: McLerran, Dennis
Subject: ECA Update

Dennis,
I hope you are well.

You may have heard that Carnival Corporation has had initial discussions with Bill Charmley and others at EPA and USCG regarding a MARPOL Regulation 3 Exemption for technology R&D. We are proposing an aggressive scrubber development and installation program. This would apply to Carnival, Princess, Holland America, Cunard and other ships operating in the North American ECA.

This approach was partially a result of my discussions with you, and subsequently with Chris Grundler regarding a technology-based approach rather than population-weighted averaging.

We believe we have a promising technology that will offer added benefits beyond sulfur reduction. Our proposal would include shorepower and other initiatives.

I would be grateful for an opportunity to discuss this further with you. I'm in DC today and Saturday, then in Miami for the Cruise Shipping Miami Conference next week, but will have email and cell.

Below is my contact information.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

202.347.7150 Office
202.538.0431 Cell

Appointment

From: Stewart, Gwen [Stewart.Gwen@epa.gov]
Sent: 7/22/2013 4:26:14 PM
To: Charmley, William [charmley.william@epa.gov]; Jeffrey.g.Lantz@uscg.mil; tdow@carnival.com
CC: Stewart, Lori [Stewart.Lori@epa.gov]; Stewart, Gwen [Stewart.Gwen@epa.gov]; Iffland, JoNell [Iffland.JoNell@epa.gov]

Subject: CONFIRMED: Carnival with T. Dow and J. Lantz
Location: RM. 6520 DC/ By Telephone: Ex. 6 Personal Privacy (PP)

Start: 7/25/2013 7:00:00 PM
End: 7/25/2013 8:00:00 PM
Show Time As: Tentative

Appointment

From: Samulski, Michael [samulski.michael@epa.gov]
Sent: 7/2/2013 8:55:18 PM
To: Samulski, Michael [samulski.michael@epa.gov]; tdow@carnival.com; Charmley, William [charmley.william@epa.gov]; Jeffrey.G.Lantz@uscg.mil; Mauger, John W CAPT [John.W.Mauger@uscg.mil]; McAvoy, Kyle P CAPT [Kyle.P.McAvoy@uscg.mil]; Stout, Alan [stout.alan@epa.gov]; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Epp, Timothy [Epp.Timothy@epa.gov]; Aranda, Amber [aranda.amber@epa.gov]
CC: Iffland, JoNell [Iffland.JoNell@epa.gov]; Revelt, Jean-Marie [revelt.jean-marie@epa.gov]

Subject: Carnival/USCG/EPA Call on Scrubber Development Program

Start: 7/10/2013 12:00:00 PM
End: 7/10/2013 1:00:00 PM
Show Time As: Busy

Appointment

From: Simon, Joseph [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=F1B1E3C1D483451B992ADE1CAC288F49-SIMON, JOSEPH]
Sent: 4/11/2013 3:35:44 PM
To: Charmley, William [charmley.william@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; Mueller, John [mueller.john@epa.gov]; Revelt, Jean-Marie [revelt.jean-marie@epa.gov]; Stout, Alan [stout.alan@epa.gov]; 'Jeffrey.G.Lantz@uscg.mil' [Jeffrey.G.Lantz@uscg.mil]; 'John.W.Mauger@uscg.mil' [John.W.Mauger@uscg.mil]; 'Kyle.P.McAvoy@uscg.mil' [Kyle.P.McAvoy@uscg.mil]; 'Paul.f.thomas@uscg.mil' [Paul.f.thomas@uscg.mil]; tdow@carnival.com
CC: Zamperini, Michael B CDR [Michael.B.Zamperini@uscg.mil]; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]

Subject: Carnival ECA Regulation 3 Exemption Update
Location: Bill's Office N165

Start: 4/19/2013 1:30:00 PM
End: 4/19/2013 3:00:00 PM
Show Time As: Busy

Appointment

From: Grundler, Christopher [grundler.christopher@epa.gov]
Sent: 7/22/2013 2:03:46 PM
To: Grundler, Christopher [grundler.christopher@epa.gov]; Charmley, William [charmley.william@epa.gov]; Jeffrey.g.Lantz@uscg.mil; tdow@carnival.com
CC: Stewart, Lori [Stewart.Lori@epa.gov]; Stewart, Gwen [Stewart.Gwen@epa.gov]; Iffland, JoNell [Iffland.JoNell@epa.gov]

Subject: CONFIRMED: Carnival with T. Dow and J. Lantz
Location: RM. 6520 DC/ By Telephone: Ex. 6 Personal Privacy (PP)

Start: 7/25/2013 7:00:00 PM
End: 7/25/2013 8:00:00 PM
Show Time As: Busy

Appointment

From: Simon, Joseph [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=F1B1E3C1D483451B992ADE1CAC288F49-SIMON, JOSEPH]
Sent: 4/11/2013 3:35:44 PM
To: Charmley, William [charmley.william@epa.gov]; Samulski, Michael [samulski.michael@epa.gov]; Mueller, John [mueller.john@epa.gov]; Revelt, Jean-Marie [revelt.jean-marie@epa.gov]; Stout, Alan [stout.alan@epa.gov]; 'Jeffrey.G.Lantz@uscg.mil' [Jeffrey.G.Lantz@uscg.mil]; 'John.W.Mauger@uscg.mil' [John.W.Mauger@uscg.mil]; 'Kyle.P.McAvoy@uscg.mil' [Kyle.P.McAvoy@uscg.mil]; 'Paul.f.thomas@uscg.mil' [Paul.f.thomas@uscg.mil]; tdow@carnival.com
CC: Zamperini, Michael B CDR [Michael.B.Zamperini@uscg.mil]; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]

Subject: Carnival ECA Regulation 3 Exemption Update
Location: Bill's Office N165

Start: 4/19/2013 1:30:00 PM
End: 4/19/2013 3:00:00 PM
Show Time As: Busy

Ex. 6 Personal Privacy (PP)

This meeting will only be for 60-90 minutes.

Appointment

From: Samulski, Michael [samulski.michael@epa.gov]
Sent: 7/2/2013 8:55:18 PM
To: Samulski, Michael [samulski.michael@epa.gov]; tdow@carnival.com; Charmley, William [charmley.william@epa.gov]; Jeffrey.G.Lantz@uscg.mil; Mauger, John W CAPT [John.W.Mauger@uscg.mil]; McAvoy, Kyle P CAPT [Kyle.P.McAvoy@uscg.mil]; Stout, Alan [stout.alan@epa.gov]; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Epp, Timothy [Epp.Timothy@epa.gov]; Aranda, Amber [aranda.amber@epa.gov]
CC: Iffland, JoNell [Iffland.JoNell@epa.gov]; Revelt, Jean-Marie [revelt.jean-marie@epa.gov]

Subject: Carnival/USCG/EPA Call on Scrubber Development Program

Start: 7/10/2013 12:00:00 PM
End: 7/10/2013 1:00:00 PM
Show Time As: Busy

To continue our discussions on the scrubber development program. We can use the following call-in number:

Ex. 6 Personal Privacy (PP)

Appointment

From: Grundler, Christopher [grundler.christopher@epa.gov]
Sent: 7/22/2013 2:03:46 PM
To: Grundler, Christopher [grundler.christopher@epa.gov]; Charmley, William [charmley.william@epa.gov]; Jeffrey.g.Lantz@uscg.mil; tdow@carnival.com
CC: Stewart, Lori [Stewart.Lori@epa.gov]; Stewart, Gwen [Stewart.Gwen@epa.gov]; Iffland, JoNell [Iffland.JoNell@epa.gov]

Subject: CONFIRMED: Carnival with T. Dow and J. Lantz
Location: RM. 6520 DC/ By Telephone: Ex. 6 Personal Privacy (PP)

Start: 7/25/2013 7:00:00 PM
End: 7/25/2013 8:00:00 PM
Show Time As: Busy

MEETING PARTICIPANTS:

Gwen,
Stein Kruse is confirmed to call in.
Regards,

Tom Dow

> -----Original Message-----
> From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
> Sent: Monday, July 22, 2013 10:54 AM
> To: Stewart, Gwen
> Subject: Re: Meeting with Carnival
>
> Gwen,
> We can confirm that July 25 from 3-4pm works for us. Mike Kaczmarek and I will attend in person.
>
> I am checking on Stein Kruse's availability to call in from Seattle. Stein is CEO of Holland America Line and is the lead CEO in the ECA-EPA proposal. I will confirm his participation later today.
>
> Thank you for your assistance.
> Regards,
>
> Tom Dow
> Vice President, Public Affairs
> Carnival North America LLC
> Washington, DC

Gwen - if Tom Dow comes in to meet Chris, I would like to attend in person if that would be OK.

Jeff

MEETING REQUEST:

Gwen -

Chris would like to have a meeting with representative from the company Carnival later this week. Chris said we should make this a high priority and do what we can to accommodate this meeting. If you can work with Tom Dow from Carnival to set up this meeting I would appreciate it. Tom's email address (I have copied Tom on this message) is:

tdow@carnival.com

We would like to target this upcoming Thursday, July 25 or Friday, July 26, while Chris is in D.C.

Please also invite Mr. Jeff Lantz from the Coast Guard - I have let Jeff know about this meeting request. Jeff's email address is:

jeffery.g.lantz@uscg.mil

I should note that I am on travel all day on Thursday, but that should not matter. If Thursday works best, we should schedule this for Thursday and I will try to participate by phone.

Please let me know if you have any question on this.

Thanks
Bill

Appointment

From: Samulski, Michael [samulski.michael@epa.gov]
Sent: 7/3/2013 2:50:08 PM
To: tdow@carnival.com; Charmley, William [charmley.william@epa.gov]; Jeffrey.G.Lantz@uscg.mil; Mauger, John W CAPT [John.W.Mauger@uscg.mil]; McAvoy, Kyle P CAPT [Kyle.P.McAvoy@uscg.mil]; Stout, Alan [stout.alan@epa.gov]; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Epp, Timothy [Epp.Timothy@epa.gov]; Aranda, Amber [aranda.amber@epa.gov]
CC: Iffland, JoNell [Iffland.JoNell@epa.gov]; Revelt, Jean-Marie [revelt.jean-marie@epa.gov]

Subject: Carnival/USCG/EPA Call on Scrubber Development Program

Start: 7/10/2013 12:00:00 PM
End: 7/10/2013 1:00:00 PM
Show Time As: Tentative

To continue our discussions on the scrubber development program. We can use the following call-in number:

Ex. 6 Personal Privacy (PP)

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 5/6/2013 4:51:49 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: RE: Checking in RE: ECA

Thanks, Bill for getting back to me.
Is there anything further that I can provide to assist in the process? We are working on protocols for reporting both the progress on the project and performance of units installed. Reporting seemed to me to be a concern to the USCG. Happy to discuss any time you have a few minutes.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

202.347.7150 Office
202.538.0431 Cell

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Monday, May 06, 2013 12:43 PM
To: Dow, Thomas (CarnCorp)
Subject: RE: Checking in RE: ECA

Dear Tom –

I apologize for not having responded to your recent inquiries. I have had to take some of my furlough days, and I have been on travel a lot in the past two weeks.

Within EPA we are in the process of briefing up our management chain regarding the draft regulation 3 permit plan from Carnival. This could take another 2 weeks to complete, though I am pushing to make it happen sooner.

My understanding is that Coast Guard is doing the same thing, at which point we will be able to get back to Carnival.

Best regards,

Bill Charmley

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, May 03, 2013 10:47 AM
To: Charmley, William
Subject: FW: Checking in RE: ECA

Bill
A gentle reminder that we need to connect, today if possible.

I will be in DC today and through the weekend, next week I am traveling Tuesday afternoon and Wednesday, but will be here Mon, Tuesday morning, Thursday and Friday.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

202.347.7150 Office
202.538.0431 Cell

From: Dow, Thomas (CarnCorp)
Sent: Wednesday, May 01, 2013 3:53 PM
To: William Charmley (Charmley.William@epamail.epa.gov)
Subject: Checking in RE: ECA

Bill,
I hope we can connect this week to discuss next steps in the Carnival ECA Scrubber Exemption discussions. I believe we left it last time with an understanding that one more conference call would be required before Carnival submits a formal proposal to EPA and USCG.

We would like to see this call scheduled for next week so that we can finalize the formal submittal before the end of May. We are concerned with the impact that delays could have on itinerary planning as well as project scheduling.

I'm in DC this week. Pick a time that works for you for a quick call and I will try to accommodate it. 10-15 minutes should be adequate.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 7/12/2013 2:50:23 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Checking In

Bill
3pm works for me. I'm on another call from 3:30-4:30.
I'm in my DC office, 202.347.7150. 10 minutes should be adequate.
Thanks,

Tom Dow

Sent from my iPad

On Jul 12, 2013, at 10:45 AM, "Charmley, William"
<charmley.william@epa.gov<mailto:charmley.william@epa.gov>> wrote:

Tom

How does 3 or 4pm this afternoon work for you?

If either of these work, what number can I call you at?

Thanks
Bill

_____
From: Dow, Thomas (CarnCorp) <TDow@carnival.com<mailto:TDow@carnival.com>>
Sent: Thursday, July 11, 2013 9:17:14 AM
To: Charmley, William
Subject: Checking In

Bill
Are you available for a quick follow up call today or tomorrow? I have a 3pm call, open otherwise.
Thanks.

Tom Dow
202.347.7150

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 4/8/2013 9:15:36 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: RE: Carnival ECA Regulation 3 Exemption Update

Thanks Bill, Look forward to speaking with you then.

Tom

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Monday, April 08, 2013 4:51 PM
To: Dow, Thomas (CarnCorp)
Subject: RE: Carnival ECA Regulation 3 Exemption Update

Tom – I will call you at your number tomorrow at 1pm.

Thanks

Bill

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Monday, April 08, 2013 4:46 PM
To: Charmley, William
Subject: RE: Carnival ECA Regulation 3 Exemption Update

Bill,

Either time tomorrow can work for me. Pick one.

Thanks,

Tom

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Monday, April 08, 2013 4:44 PM
To: Dow, Thomas (CarnCorp)
Cc: Samulski, Michael
Subject: RE: Carnival ECA Regulation 3 Exemption Update

Tom,

I apologize for not getting back with you sooner.

Are you available tomorrow (Tuesday, April 9) at either 1-2pm or 2-3pm for a call for you and I to discuss the material you have sent to EPA and Coast Guard and next steps?

Thanks

Bill

Bill Charmley
Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
2000 Traverwood Drive
Ann Arbor, MI 48105

desk ph. 734-214-4466
cell ph. 734-545-0333
e-mail: charmley.william@epa.gov

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Monday, April 08, 2013 4:17 PM
To: Charmley, William
Cc: Samulski, Michael
Subject: Carnival ECA Regulation 3 Exemption Update

Bill,

I'm resending the March 27th email and attachments for easy reference. I would be grateful for a call this week to discuss next steps.

Regards,

Tom Dow

Vice President, Public Affairs

Carnival North America LLC
Washington, DC

202.347.7150

From: Dow, Thomas (CarnCorp)
Sent: Wednesday, March 27, 2013 5:22 PM
To: William Charmley (Charmley.William@epamail.epa.gov); Jeffrey.G.Lantz@uscg.mil; Michael Samulski (Samulski.Michael@epamail.epa.gov)
Cc: paul.topping@tc.gc.ca; 'mclerran.dennis@epa.gov'
Subject: Carnival ECA Regulation 3 Exemption Update

Bill and Jeff,

Thank you for hosting the February 26th meeting with Carnival representatives. We presented a draft request for recognition of a Regulation 3 Exemption to MARPOL Annex VI in conjunction with research and development of an exhaust gas cleaning system.

As a result of the questions that you raised in the meeting, Carnival has made the following revisions to the request:

1. The number of ships to be included in the Exemption has been reduced to 59 vessels. These are listed in the first attachment. Timing is Based on drydock schedules. Twenty-two vessels will be fitted with scrubbers before 2015, resulting in early emission reductions. Another nineteen vessels will be fitted in 2015, the remaining eighteen vessels will be fitted in 2016.

2. The proposed extension has been revised from five years to a period ending December 31, 2016.

3. Scrubber commissioning should be accomplished within 60 days of installation.

4. Carnival will commit to using shorepower or MGO while at berth in Ports in the North American ECA.

5. Attachment B identifies the recent sulfur content by region, and could serve as a guide for regional average sulfur content during the Exemption period.

The balance of the Draft request stands as presented, including the scrubber data. All provisions of this request will be included in Carnival's Regulation 3 Exemption Requests to Flag Administrations. Carnival reserves the right to substitute vessels to reflect changes in deployment within the North American ECA.

I have included Paul Topping with Transport Canada and Dennis McLerran with EPA Region 10 since both have been closely involved in this issue and we intend to make the same request to Transport Canada once we have submitted the formal request to EPA and USCG.

We look forward to discussing this request further at your earliest convenience so that we might submit a formal request as soon as possible.

Regards,

Tom Dow

Vice President, Public Affairs

Carnival North America LLC

Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 4/9/2013 5:30:07 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: RE: Carnival ECA Regulation 3 Exemption Update

Bill, Sure - 2pm works for me.

Tom

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Tuesday, April 09, 2013 1:28 PM
To: Charmley, William; Dow, Thomas (CarnCorp)
Subject: RE: Carnival ECA Regulation 3 Exemption Update

Tom –

I apologize, a meeting went way to long. Can I call you in 30 minutes at 2pm?

Thanks

Bill

From: Charmley, William
Sent: Monday, April 08, 2013 4:51 PM
To: tdow@carnival.com
Subject: RE: Carnival ECA Regulation 3 Exemption Update

Tom – I will call you at your number tomorrow at 1pm.

Thanks

Bill

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Monday, April 08, 2013 4:46 PM
To: Charmley, William
Subject: RE: Carnival ECA Regulation 3 Exemption Update

Bill,

Either time tomorrow can work for me. Pick one.

Thanks,

Tom

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Monday, April 08, 2013 4:44 PM
To: Dow, Thomas (CarnCorp)
Cc: Samulski, Michael
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Are you available tomorrow (Tuesday, April 9) at either 1-2pm or 2-3pm for a call for you and I to discuss the material you have sent to EPA and Coast Guard and next steps?

Thanks

Bill

Bill Charmley
Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
2000 Traverwood Drive
Ann Arbor, MI 48105

desk ph. 734-214-4466
cell ph. 734-545-0333
e-mail: charmley.william@epa.gov

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
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Subject: Carnival ECA Regulation 3 Exemption Update

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Regards,

Tom Dow

Vice President, Public Affairs

Carnival North America LLC
Washington, DC

202.347.7150

From: Dow, Thomas (CarnCorp)
Sent: Wednesday, March 27, 2013 5:22 PM
To: William Charmley (Charmley.William@epamail.epa.gov); Jeffrey.G.Lantz@uscg.mil; Michael Samulski (Samulski.Michael@epamail.epa.gov)
Cc: paul.topping@tc.gc.ca; 'mclerran.dennis@epa.gov'
Subject: Carnival ECA Regulation 3 Exemption Update

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We look forward to discussing this request further at your earliest convenience so that we might submit a formal request as soon as possible.

Regards,

Tom Dow

Vice President, Public Affairs

Carnival North America LLC

Washington, DC

Message

From: Millett, John [Millett.John@epa.gov]
Sent: 9/2/2013 6:09:12 PM
To: Mike Flanagan [mike@ldwwgroup.com]
CC: tdow@carnival.com; Frizzell, Roger (CarnCorp) [RFrizzell@carnival.com]; Grundler, Christopher [grundler.christopher@epa.gov]; Stewart, Lori [Stewart.Lori@epa.gov]; Charmley, William [charmley.william@epa.gov]; Bloomgren, David [Bloomgren.David@epa.gov]
Subject: Re: Per Tom Dow: Checking to Coordinate ECA Release with Carnival

Thanks, Mike!

From: Mike Flanagan <mike@ldwwgroup.com>
Sent: Monday, September 02, 2013 1:24:18 PM
To: Millett, John
Cc: tdow@carnival.com; Frizzell, Roger (CarnCorp); Grundler, Christopher; Stewart, Lori; Charmley, William; Bloomgren, David
Subject: Re: Per Tom Dow: Checking to Coordinate ECA Release with Carnival

All sounds good, John, and good to meet you, team EPA!

We are on same page on timing for embargo, so good there.

Tom can do phoner with Tim Wednesday before 11 ET. Thanks for re-arranging things on your end with Chris Grundler.

And, yes, both Hannah and Ann would very much like to talk with Chris Grundler, and Wednesday should be fine.

Really appreciate chance to work with you all. Think we are good for today. Let's chat in morning.

All the best, Mike

Sent from my iPhone

On Sep 2, 2013, at 11:51 AM, "Millett, John" <Millett.John@epa.gov> wrote:

> Hi Mike -- Message rec'd -- just talked to Tom.
>
> Adding team EPA -- Chris, Lori, Bill, and David.
>
> We'd prefer that you hold off with the Balt Sun till Wed morning. I can explain why when we talk, Mike. We were planning to have Chris Grundler available Wed afternoon for press, but we can move that time up to Wed morning for the BaltSun -- to accommodate Tom's schedule.
>
> We have to stick to a thursday morning announcement, so it's very important to us that stories don't appear till Thursday morning -- reaching out to the other two pubs should be fine and we'll arrange time to have our spokespeople available on Wed. before they publish.
>
> My cell phone # is Ex. 6 Personal Privacy (PP). Or you can reach me at the office tuesday @ 202-564-2903.

Thanks --

John

From: Mike Flanagan <mike@ldwwgroup.com>
Sent: Sunday, September 01, 2013 7:25:36 PM
To: Millett, John
Cc: tdow@carnival.com; Frizzell, Roger (CarnCorp)
Subject: Per Tom Dow: Checking to Coordinate ECA Release with Carnival

Hello, John ... My name is Mike Flanagan, and Tom Dow from Carnival asked me to touch base with you. I'm providing PR support to Roger Frizzell, chief comms officer for Carnival who asked me to help with ECA news release.

Tom and Roger have filled me in on your plan for next week. All looks good. I would like to set up time for us to talk on Monday or Tuesday at latest, but in meantime, Tom said it'd be okay to reach out, introduce myself and run a couple things by you via email.

With that in mind ...

1) Timing for Embargo Interviews
For giving Tim Wheeler of Baltimore Sun the news with agreement news will be embargoed until Thursday, Sept. 5, you had advised that Tim will want to conduct a phone interview with Carnival, most likely on Tuesday, Sept. 3.

Our spokesperson will be Tom.
He is available Tuesday from 10:30 to 2 ET.
He is also open Wednesday morning before 11.

We thought this might be worth running by Tim either this evening or Monday, so that we can have phone interview all set up, if Tim has time, prior to Tuesday morning.

If you'd like to handle with Tim, and keep me posted, or copy me in, that'd be great. Or, if you'd prefer for me to handle, I'm happy to reach out to Tim. If so, if you can send along his contact info, that would be helpful.

2) Miami Herald & Seatrade Insider Embargos
Roger and Tom would like to also do embargo with two other media outlets -- Hannah Sampson, who covers Carnival for the Miami Herald in Carnival's headquarters city; and Ann Kalosh from Seatrade Insider, the well-read trade outlet which has been actively covering this issue.

3) EPA Spokesperson Availability
On above point, we will be arranging for Tom to speak with Hannah and Ann, and we think both Hannah and Ann would like to speak to your spokesperson as well.

Is that something you would be okay with?

And if so, you and I can coordinate in setting up phone interviews for your spokesperson prior to Tuesday-Wednesday.

4) News Release Timing & Distribution
Finally, a technical question: We see that you plan on issuing your news release on Thursday at 10 a.m. ET. I believe you'll want us to issue at either the same time, or immediately thereafter.

-- I figure you will be issuing for national distribution, as would we. However, I appreciate you letting me know for sure, just to be sure we're on same page. Want to make no assumptions!

Again, sorry for sending an email over a holiday weekend. Appreciate your input and look forward to hearing from you.

All the best, Mike
Cell: Ex. 6 Personal Privacy (PP)

--

Mike Flanagan

LDWW**group** | Partner

Mike@ldwwgroup.com

M Ex. 6 Personal Privacy (PP)

--

Mike Flanagan

LDWW**group** | Partner

Mike@ldwwgroup.com

M Ex. 6 Personal Privacy (PP)

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 6/13/2013 2:51:49 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Checking in

Bill
Thanks for getting back. 08.30 Monday is fine for me. Safest # for me is cell. Ex. 6 Personal Privacy (PP)

We are working on a modification to the scale of the request. I had hoped to discuss this with you and Jeff soonest.

Look forward to discussing with you Monday.
Regards,

Tom

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Thursday, June 13, 2013 10:48 AM
To: Dow, Thomas (CarnCorp)
Subject: Re: Checking in

Tom,

I have been in Ex. 6 Personal Privacy (PP) this week since sunday, and return late saturday of this week.

Do you have any open times this upcoming Monday? I could call as early as 830am eastern time on monday.

Thanks
Bill

From: Dow, Thomas (CarnCorp)
Sent: Tuesday, June 11, 2013 8:34:57 PM
To: Charmley, William
Subject: Checking in

Bill
Do you have time for a quick call today or tomorrow? I'm in DC. Any time is ok.
Thanks,

Tom Dow
202.34607.7150

Sent from my iPad

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 2/8/2013 2:39:00 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Availability for a call - ECA

Will do.
Thanks Bill
Tom

Sent from Tom Dow's Blackberry

From: Charmley.William@epamail.epa.gov [mailto:Charmley.William@epamail.epa.gov]
Sent: Friday, February 08, 2013 09:32 AM
To: Dow, Thomas (CarnCorp)
Subject: Re: Availability for a call - ECA

Tom,

please call me at Ex. 6 Personal Privacy (PP) at 5pm eastern today.

thanks
Bill

From: "Dow, Thomas (CarnCorp)" <TDow@carnival.com>
To: William Charmley/AA/USEPA/US@EPA
Date: 02/08/2013 09:18 AM
Subject: Re: Availability for a call - ECA

Bill
5pm works. What phone #? Stay warm.
Thanks.
Tom

Sent from Tom Dow's Blackberry

From: Charmley.William@epamail.epa.gov [mailto:Charmley.William@epamail.epa.gov]
Sent: Friday, February 08, 2013 09:01 AM
To: Dow, Thomas (CarnCorp)
Subject: Re: Availability for a call - ECA

Tom -

We received enough snow last night in Michigan that my **Ex. 6 Personal Privacy (PP)**
Ex. 6 Personal Privacy (PP)

Would 5pm eastern time work for you? if not, I could find a time in the mid-afternoon, but it would be tough for it to be more than 10 or 15 minutes. At 5pm I could do 30 or 45 minutes.

Let me know what might work.

thanks
Bill

==========

Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
2000 Traverwood Drive
Ann Arbor, MI 48105

desk ph. 734-214-4466
cell ph. 734-545-0333
fax. 734-214-4816
e-mail: charmley.william@epa.gov

From: "Dow, Thomas (CarnCorp)" <TDow@carnival.com>
To: William Charmley/AA/USEPA/US@EPA
Date: 02/08/2013 08:50 AM
Subject: Availability for a call - ECA

Bill,
Are you available for a quick call later today to discuss ECA?
Any time after 11:00am EST. 10-15 minutes should be adequate.
We are preparing a Carnival ECA proposal for your consideration.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 6/18/2013 1:17:52 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Baltimore Sun ECA Article

Bill,
Pasted below is the statement that Carnival provided to the Baltimore Sun reporter for the article that we discussed yesterday. Please feel free to share this as you deem appropriate.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

For several years cruise lines, including Carnival, have been exploring alternative compliance with EPA as provided under IMO ECA regulations. Every alternative includes use of fuel that meets or exceeds ECA low sulfur fuel in ports, including in the Port of Baltimore. These alternatives include development and installation of a new generation of exhaust gas scrubbers that will meet or exceed ECA standards. IMO does not allow waivers. Averaging or temporary exemptions for technology are specifically allowed. EPA has granted several of these. Cruise ports in the U.S and Canada are well aware of these ongoing efforts and recognize the implications as the next phase of ECA takes effect in 2015. Meanwhile, Carnival Cruise Lines is complying with ECA regulations, and has been since August 2012 when they came into force.

Carnival Cruise Lines currently operates a cruise program from the Port of Baltimore aboard the Carnival Pride. We currently have voyages from Baltimore open for sale through April 2014 and all of those departures will operate as planned. Carnival has not yet announced deployment for several programs for the period of May 2014 through April 2015 including the Baltimore cruise program. We expect to announce the deployment for these programs by the end of June 2013.

Carnival Cruise Lines complies with all applicable operational requirements established by the U.S. Coast Guard, EPA and all other U.S. authorities. Carnival will continue to comply with all of these requirements during current and future operations for all of our ships operating in the U.S.

###

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 4/2/2013 2:25:38 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Checking in

Bill,
I hope you had a good Easter weekend. I'm checking to confirm that your received the email last week with some revisions/clarifications to Carnival's ECA Regulation 3 Exemption request.
Are you available for a quick call this week to discuss next steps? I'm in DC all week.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

202.347.7150

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 5/29/2013 9:07:40 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Dates for June Carnival Meeting in DC REVISED REQUEST

Bill
2-3 hours should be fine. We can be available anytime after 12:00 noon.
Thanks,
Tom

Sent from my iPad

On May 29, 2013, at 2:05 PM, "Charmley, William" <charmley.william@epa.gov> wrote:

> Tom -
>
> We can meet on the afternoon of June 6, at US Coast Guard headquarters. I am trying to nail down a specific time - how much time should we allow for this meeting - 2 hours?
>
>
> I have also asked Coast Guard to provide me with the name of the point of contact for the meeting which I will share with you for coordination on the logistics of the meeting.
>
>
>
> Thanks
> Bill
>
>
>
> -----Original Message-----
> From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
> Sent: Wednesday, May 29, 2013 2:30 PM
> To: Charmley, William
> Subject: Re: Dates for June Carnival Meeting in DC REVISED REQUEST
>
> Bill,
> A reminder that we can be ready June 6th if this works for you and the USCG.
> Thanks,
>
> Tom
>
> Sent from my iPad
>
> On May 28, 2013, at 6:56 PM, "Charmley, William" <charmley.william@epa.gov<mailto:charmley.william@epa.gov>> wrote:
>
> Tom,
>
> I apologize for not getting back with you on our options for a face-to-face meeting between Carnival, Coast Guard, and EPA. I believe my colleagues in the Coast Guard may have a difficult time hosting a meeting on June 17-19. I believe 3 of their key people will be on international travel that week. Jeff Lantz is going to get back with me tomorrow.
>
> As we discussed last week, this meeting will focus on the technical merits of Carnival's request for a regulation 3 exemption for additional vessels beyond the 5 to 6 vessels which Coast Guard and EPA have indicated we believe would be eligible for a regulation 3 exemption under Annex VI. Carnival has explained to the two government agencies that the SOx scrubber technology will develop rapidly during the first several on-ship installations, and that those initial learning's will be used to make modifications to both the design of the scrubber technology for future installations, and also development of the installation process and on-ship modifications needed to install this emission control equipment. What we believe is missing thus far from Carnival is a detailed explanation of how the technology will be developed under a regulation 3 exemption for vessels after the first 5 or 6 ships.
>
> I am hopeful that an in person meeting will be useful for the government agencies in order for us to better understand the technical approach and technology development which can occur from a large scale installation of this technology.
>
> Regarding a face-to-face meeting, if the week of June 17 is not possible, we (EPA and Coast Guard) are going to explore several options:
>

> * The week of June 10. I will be on travel overseas, but I believe that Mike Samulski on my staff is available. If the right people from the Coast Guard are available, we can look into having a meeting that week.
>
>
>
> * We could look again at Thursday, June 6 and see if there is any possibility Carnival could be ready by June 6
>
>
>
> * We could look into having a conference call in advance of a face-to-face meeting. This could provide an opportunity to make additional progress in the event we can't meet until the week of June 24.
>
>
>
> * If we aren't able to meet until later in June, I believe it would be very helpful if Carnival could provide any technical information regarding the technology development/challenges associated with the proposed SOx scrubber program that can help explain to Coast Guard and EPA how the technology will continue to develop after the initial 5-6 vessel installations which would warrant including more vessels in a regulation 3 exemption program.
>
>
> I will let you know as soon as I can on Wednesday what our options are for a meeting in June.
>
>
>
> Best regards,
>
>
>
> Bill
>
>
>
> Bill Charmley
> Acting Director
> Assessment and Standards Division
> Office of Transportation and Air Quality U.S. Environmental Protection Agency
>
> National Vehicle and Fuel Emissions Laboratory
> 2000 Traverwood Drive
> Ann Arbor, MI 48105
>
> desk ph. 734-214-4466
> cell ph. 734-545-0333
> e-mail: charmley.william@epa.gov<mailto:charmley.william@epa.gov>
>
>
>
> From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
> Sent: Thursday, May 23, 2013 4:19 PM
> To: Charmley, William
> Cc: Kaczmarek, Michael (CarnCorp); Evans, Eric (CarnCorp); Brennan, Brian (CarnCorp)
> Subject: Re: Dates for June Carnival Meeting in DC REVISED REQUEST
>
> Thanks Bill.
> We will hold both dates.
> Tom
> ---
> Sent from Tom Dow's Blackberry
>
>
> From: Charmley, William [mailto:charmley.william@epa.gov]
> Sent: Thursday, May 23, 2013 04:06 PM
> To: Dow, Thomas (CarnCorp)
> Subject: RE: Dates for June Carnival Meeting in DC REVISED REQUEST
>
> Tom,
>
>
> I have shared your three potential dates with Coast Guard and with my staff. Unfortunately I have not heard back from my colleagues in the Coast Guard yet.
>
>
> For EPA, June 19 is the best date, followed by June 17. June 18 won't work for us.
>
>

> I may not hear back from Coast Guard until Tuesday of next week, so for now please keep a hold on both June 17 and June 19.
>
>
> Thanks
> Bill Charmley
>
>
> From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
> Sent: Wednesday, May 22, 2013 3:32 PM
> To: Charmley, William
> Subject: Dates for June Carnival Meeting in DC REVISED REQUEST
>
> Bill,
> June 6 is not good for Carnival's senior technical representative. I understand you are not available the week of June 10th.
> We would propose the following week, June 17, 18 or 19, with Monday, June 17th being first choice. June 20-21 won't work for us.
> Please advise if any of the dates can work for you.
> Thanks,
>
> Tom Dow
> Vice President, Public Affairs
> Carnival North America LLC
> Washington, DC
>
>

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 5/31/2013 7:10:20 PM
To: Charmley, William [charmley.william@epa.gov]; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Subject: Re: Dates for June Carnival Meeting in DC REVISED REQUEST

Thanks Bill.
Mike, Eric and I are holding open the entire afternoon pending confirmation of the start time.
Regards,

Tom

Sent from Tom Dow's Blackberry

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Friday, May 31, 2013 03:07 PM
To: Evans, Eric (CarnCorp); Dow, Thomas (CarnCorp)
Subject: RE: Dates for June Carnival Meeting in DC REVISED REQUEST

Eric and Tom –

I just sent another request to Coast Guard to lock in a time. I asked them for a 2 hour block for this meeting.

As soon as I head something I will let both of you know.

Thanks
Bill

From: Evans, Eric (CarnCorp) [mailto:EEvans@carnival.com]
Sent: Friday, May 31, 2013 2:46 PM
To: Charmley, William
Subject: RE: Dates for June Carnival Meeting in DC REVISED REQUEST

Good afternoon Bill,

Has the meeting time for June 6th been set yet?
Thanks
Eric

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Tuesday, May 28, 2013 9:56 PM
To: Dow, Thomas (CarnCorp)
Cc: Kaczmarek, Michael (CarnCorp); Evans, Eric (CarnCorp); Brennan, Brian (CarnCorp)
Subject: RE: Dates for June Carnival Meeting in DC REVISED REQUEST

Tom,

I apologize for not getting back with you on our options for a face-to-face meeting between Carnival, Coast Guard, and EPA. I believe my colleagues in the Coast Guard may have a difficult time hosting a meeting on June 17-19. I believe 3 of their key people will be on international travel that week. Jeff Lantz is going to get back with me tomorrow.

As we discussed last week, this meeting will focus on the technical merits of Carnival's request for a regulation 3 exemption for additional vessels beyond the 5 to 6 vessels which Coast Guard and EPA have indicated we believe would be eligible for a regulation 3 exemption under Annex VI. Carnival has explained to the two government agencies that the SOx scrubber technology will develop rapidly during the first several on-ship installations, and that those initial learning's will be used to make modifications to both the design of the scrubber technology for future installations, and also development of the installation process and on-ship modifications needed to install this emission control equipment. What we believe is missing thus far from Carnival is a detailed explanation of how the technology will be developed under a regulation 3 exemption for vessels after the first 5 or 6 ships.

I am hopeful that an in person meeting will be useful for the government agencies in order for us to better understand the technical approach and technology development which can occur from a large scale installation of this technology.

Regarding a face-to-face meeting, if the week of June 17 is not possible, we (EPA and Coast Guard) are going to explore several options:

- The week of June 10. I will be on travel overseas, but I believe that Mike Samulski on my staff is available. If the right people from the Coast Guard are available, we can look into having a meeting that week.

- We could look again at Thursday, June 6 and see if there is any possibility Carnival could be ready by June 6

- We could look into having a conference call in advance of a face-to-face meeting. This could provide an opportunity to make additional progress in the event we can't meet until the week of June 24.

- If we aren't able to meet until later in June, I believe it would be very helpful if Carnival could provide any technical information regarding the technology development/challenges associated with the proposed SOx scrubber program that can help explain to Coast Guard and EPA how the technology will continue to develop after the initial 5-6 vessel installations which would warrant including more vessels in a regulation 3 exemption program.

I will let you know as soon as I can on Wednesday what our options are for a meeting in June.

Best regards,

Bill

Bill Charmley
Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality

U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
2000 Traverwood Drive
Ann Arbor, MI 48105

desk ph. 734-214-4466
cell ph. 734-545-0333
e-mail: charmley.william@epa.gov

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Thursday, May 23, 2013 4:19 PM
To: Charmley, William
Cc: Kaczmarek, Michael (CarnCorp); Evans, Eric (CarnCorp); Brennan, Brian (CarnCorp)
Subject: Re: Dates for June Carnival Meeting in DC REVISED REQUEST

Thanks Bill.
We will hold both dates.
Tom

Sent from Tom Dow's Blackberry

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Thursday, May 23, 2013 04:06 PM
To: Dow, Thomas (CarnCorp)
Subject: RE: Dates for June Carnival Meeting in DC REVISED REQUEST

Tom,

I have shared your three potential dates with Coast Guard and with my staff. Unfortunately I have not heard back from my colleagues in the Coast Guard yet.

For EPA, June 19 is the best date, followed by June 17. June 18 won't work for us.

I may not hear back from Coast Guard until Tuesday of next week, so for now please keep a hold on both June 17 and June 19.

Thanks
Bill Charmley

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, May 22, 2013 3:32 PM
To: Charmley, William
Subject: Dates for June Carnival Meeting in DC REVISED REQUEST

Bill,
June 6 is not good for Carnival's senior technical representative. I understand you are not available the week of June 10th.
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Please advise if any of the dates can work for you.
Thanks,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 5/29/2013 3:01:24 AM
To: Charmley, William [charmley.william@epa.gov]
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Evans, Eric (CarnCorp) [EEvans@carnival.com]; Brennan, Brian (CarnCorp) [BBrennan@carnival.com]
Subject: Re: Dates for June Carnival Meeting in DC REVISED REQUEST

Bill
I will check again on June 6th and look forward to your update tomorrow.
Thanks,

Tom

Sent from my iPad

On May 28, 2013, at 6:56 PM, "Charmley, William"
<charmley.william@epa.gov<mailto:charmley.william@epa.gov>> wrote:

Tom,

I apologize for not getting back with you on our options for a face-to-face meeting between Carnival, Coast Guard, and EPA. I believe my colleagues in the Coast Guard may have a difficult time hosting a meeting on June 17-19. I believe 3 of their key people will be on international travel that week. Jeff Lantz is going to get back with me tomorrow.

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Best regards,

Bill

Bill Charmley
Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
2000 Traverwood Drive
Ann Arbor, MI 48105

desk ph. 734-214-4466
cell ph. 734-545-0333
e-mail: charmley.william@epa.gov<mailto:charmley.william@epa.gov>

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Thursday, May 23, 2013 4:19 PM
To: Charmley, William
Cc: Kaczmarek, Michael (CarnCorp); Evans, Eric (CarnCorp); Brennan, Brian (CarnCorp)
Subject: Re: Dates for June Carnival Meeting in DC REVISED REQUEST

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Tom

Sent from Tom Dow's Blackberry

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Thursday, May 23, 2013 04:06 PM
To: Dow, Thomas (CarnCorp)
Subject: RE: Dates for June Carnival Meeting in DC REVISED REQUEST

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I may not hear back from Coast Guard until Tuesday of next week, so for now please keep a hold on both June 17 and June 19.

Thanks
Bill Charmley

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, May 22, 2013 3:32 PM
To: Charmley, William
Subject: Dates for June Carnival Meeting in DC REVISED REQUEST

Bill,
June 6 is not good for Carnival's senior technical representative. I understand you are not available the week of June 10th.
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Please advise if any of the dates can work for you.
Thanks,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 9/11/2013 4:41:32 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Carnival ECA Scrubber Exemption - Permit
Attachments: Carnival Reg 3 ECA Exemption Request Template - HAL 0913.docx

Bill,
Attached is the template that Carnival will use for securing Flag State approval of the Regulation 3 Scrubber Exemption.

Holland America Line intends to present this to the Netherlands in the next few days. We have delayed submitting the request in consideration of the timing of the public announcement last week, and there is a great sense of urgency to move to the next step. The other cruise lines will be doing the same with Bahamas, Bermuda, and Panama very soon.

We are still reviewing the final list of ships, and will provide this to you next week. As we discussed, the total will not change from 32, and no more than 7 will be scheduled for scrubber installation in 2016. Management is determining if it is possible to accelerate installation for a few of the 2016 ships.

Lastly, thanks for your work on this project. Please contact me if you have any questions.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 5/21/2013 8:33:01 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: USCG & EPA Call - Carnival ECA Regulation 3 Scrubber Exemption

Bill
Got it. Thanks
Tom

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Tuesday, May 21, 2013 04:30 PM
To: Dow, Thomas (CarnCorp)
Subject: Re: USCG & EPA Call - Carnival ECA Regulation 3 Scrubber Exemption

Tom,

Please call me at 830am tomorrow at this number:

Ex. 6 Personal Privacy (PP)

Thanks
Bill

From: Dow, Thomas (CarnCorp)
Sent: Tuesday, May 21, 2013 11:44:45 AM
To: Charmley, William
Subject: RE: USCG & EPA Call - Carnival ECA Regulation 3 Scrubber Exemption

Bill,
I can break away from the conference and call you from Boston at 08:30. Please advise best number.

Also, for your information I have posted below some information on IMO allowance for interpretation. This specifically relates to Royal Caribbean 's Fleet Averaging Equivalency. However it addresses directly a point made by Capt. Thomas that USCG was intent on following precisely the wording of IMO Regulation 3. Our view is that IMO would not refuse to accept a broader reading if it was approved by Flag Administrations and was not opposed by the U.S. Note reference to "interpretation of the parties."
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Ex. 6 Personal Privacy (PP) Cell

****

The US submission to MEPC 65 clarifies the US position on the questions that BLG said needed to be referred to MEPC. One of those questions was whether,
if emissions averaging was allowed as an equivalency method under MARPOL Annex VI, it could be applied to a group of ships.

The paper submitted by United States stated :

"does not envisage an emission-averaging program developed under regulation 4 as being applicable on a global basis, but rather only within limited geographic areas, namely an ECA and then

It might even be applicable to a group of ships wit over a limited period in a specific geographical region within an ECA.

Also the US said that because it is the port States that are generally responsible for the air quality in their countries, the port State should be consulted about any proposed emissions-averaging program for ships that operate within the port State's jurisdiction.

The US does not think it is necessary to include these provisions in guidelines intended to address broader equivalencies to regulation 14" of MARPOL Annex VI" means that this is left to interpretation of the parties and it is clear how the parties of US, Canada, Malta, Bahamas, and France interpret this matter.

CLIA approached Jeff Lantz and on this matter and both agree that the result is the status quo.

****

-----Original Message-----
From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Tuesday, May 21, 2013 11:22 AM
To: Dow, Thomas (CarnCorp)
Subject: RE: USCG & EPA Call - Carnival ECA Regulation 3 Scrubber Exemption

Tom -

I had to take Ex. 6 Personal Privacy (PP) and I'm booked this afternoon.

Are you available on Wednesday morning at say 8:30am for a short call?

Thanks
Bill

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Tuesday, May 21, 2013 8:00 AM
To: Charmley, William
Subject: Re: USCG & EPA Call - Carnival ECA Regulation 3 Scrubber Exemption

Bill
Today I'm available from 9.45-11am or 12.30-4.30pm. After 7.30 pm I will be available in Boston on cell.
Regards.

Tom Dow

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Monday, May 20, 2013 02:56 PM
To: Dow, Thomas (CarnCorp)
Subject: RE: USCG & EPA Call - Carnival ECA Regulation 3 Scrubber Exemption

Tom -

Can I call you on my drive home this evening, say around 5:15 or 5:30?

Thanks
Bill

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Monday, May 20, 2013 2:35 PM
To: Charmley, William
Cc: paul.topping@tc.gc.ca; Samulski, Michael
Subject: USCG & EPA Call - Carnival ECA Regulation 3 Scrubber Exemption

Bill and Paul,
Since you were unable to participate in the call today, you should know that Carnival was very disappointed to learn that USCG and EPA were only willing to consider approximately 10% of the number of

ships for an maximum of six months prior to scrubber installation. On first blush this appears to be 3-5% of the proposed scale.

We are assessing the impact on our proposed large scale, "all-in" scrubber development project. I hope it does not result in a reduction of the effort, and a concurrent impact on the areas of North America that are the most significantly impacted by the cost of the ECA. As you know, Canada, Alaska, and New England are dramatically impacted. Others include Galveston, New Orleans, Baltimore and Charleston.

Wednesday I will participate in another panel on ECA at the Canada-New England Cruise Symposium in Boston. I will report that we have had a setback. We will continue to work with both Governments to find innovative approaches to mitigate the economic impact and chief pave the goal of reducing the risk to public health. I will not, however, be able to offer assurances that itineraries will not be impacted.

We understand that the USCG is interpreting the language of Regulation 3 in a narrow fashion. We cannot agree that this takes into consideration the broader benefits of demonstrating scrubber technology as practical on a large-scale commercial basis. The result will be less incentive to make a massive commitment, and a likelihood that this technology will continue to develop on a piecemeal basis, as it has for the past six years. This would be unfortunate for the maritime industry and coastal economies.

I would be grateful for any input from either of you on alternative next steps.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

On May 17, 2013, at 12:52 PM, "Charmley, William"
<charmley.william@epa.gov<mailto:charmley.william@epa.gov>> wrote:

Tom -

Mike Samulski did reach out to Paul this past week, apparently Monday is a public holiday in Canada. Given our challenges in finding a date and time that worked for everyone, Paul was okay with Coast Guard and EPA having this next discussion without Transport Canada.

Thanks
Bill

Bill Charmley
Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
2000 Traverwood Drive
Ann Arbor, MI 48105

desk ph. 734-214-4466
cell ph. 734-545-0333
e-mail: charmley.william@epa.gov<mailto:charmley.william@epa.gov>

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, May 17, 2013 3:42 PM
To: 'Charles.K.Fluke@uscg.mil<mailto:Charles.K.Fluke@uscg.mil>'; Charmley, William
Subject: Re: Phone conn w/Carnival, USCG & EPA to discuss MARPOL Annex VI proposal

LCDR Fluke,
Did you intend to invite Paul Topping from Transport Canada?
Tom

Sent from Tom Dow's Blackberry

From: Fluke, Charles K LCDR [mailto:Charles.K.Fluke@uscg.mil]
Sent: Friday, May 17, 2013 03:32 PM

To: Dow, Thomas (CarnCorp); Kaczmarek, Michael (CarnCorp); Thomas, Paul F CAPT <Paul.F.Thomas@uscg.mil<mailto:Paul.F.Thomas@uscg.mil>>; McAvoy, Kyle P CAPT <Kyle.P.McAvoy@uscg.mil<mailto:Kyle.P.McAvoy@uscg.mil>>; Mauger, John W CAPT <John.W.Mauger@uscg.mil<mailto:John.W.Mauger@uscg.mil>>; Lantz, Jeffrey G SES <Jeffrey.G.Lantz@uscg.mil<mailto:Jeffrey.G.Lantz@uscg.mil>>; Zamperini, Michael B CDR <Michael.B.Zamperini@uscg.mil<mailto:Michael.B.Zamperini@uscg.mil>>; Marcy, Chris K CDR <Chris.K.Marcy@uscg.mil<mailto:Chris.K.Marcy@uscg.mil>>; Nicholson, Jeanmarie <Jeanmarie.Nicholson@uscg.mil<mailto:Jeanmarie.Nicholson@uscg.mil>>; 'Samulski.Michael@epamail.epa.gov<mailto:Samulski.Michael@epamail.epa.gov>' <Samulski.Michael@epamail.epa.gov<mailto:Samulski.Michael@epamail.epa.gov>>; 'aranda.amber@epamail.epa.gov<mailto:aranda.amber@epamail.epa.gov>' <aranda.amber@epamail.epa.gov<mailto:aranda.amber@epamail.epa.gov>>; 'Epp.Timothy@epamail.epa.gov<mailto:Epp.Timothy@epamail.epa.gov>' <Epp.Timothy@epamail.epa.gov<mailto:Epp.Timothy@epamail.epa.gov>>; 'Revelt.Jean-Marie@epamail.epa.gov<mailto:Revelt.Jean-Marie@epamail.epa.gov>' <Revelt.Jean-Marie@epamail.epa.gov<mailto:Revelt.Jean-Marie@epamail.epa.gov>>; 'charmley.william@epa.gov<mailto:charmley.william@epa.gov>' <charmley.william@epa.gov<mailto:charmley.william@epa.gov>>
Subject: Phone conn w/Carnival, USCG & EPA to discuss MARPOL Annex VI proposal

When: Monday, May 20, 2013 11:00 AM-12:00 PM (GMT-05:00) Eastern Time (US & Canada).
Where: TBD
Note: The GMT offset above does not reflect daylight saving time adjustments.
~~*~*~*~*~*~*~*~*~*

Captain's et al,
The following date and time has been scheduled for a conference call between the US Gov't (USCG/EPA) and Carnival to discuss their Annex VI exemption proposal.

If you are aware of any attendees I may have missed, please forward this invite on my behalf.
Date: 20 May
Time: 11:00
Teleconference Info:
Phone in number: Ex. 6 Personal Privacy (PP)
Leader access code (USCG - Capt Thomas): Ex. 6 Personal Privacy (PP) Participants access: Ex. 6 Personal Privacy (PP)

Captain Mauger, is your conf room available for USCG members to meet/collectively call in from?

Respectfully,
Chuck

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 8/23/2013 5:51:26 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Epa press office contact

Got it. Thanks Bill.
I will have someone establish contact with John on Monday.
Regards.
Tom

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Friday, August 23, 2013 07:57 AM
To: Dow, Thomas (CarnCorp)
Subject: Epa press office contact

Tom -

here is the contact information for John Millett within the EPA press office.

John Millett
millett.john@epa.gov

desk number is 202-546-2903

cell is Ex. 6 Personal Privacy (PP)

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 2/14/2013 4:52:03 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Carnival Meeting in DC

Thanks Bill

Sent from Tom Dow's Blackberry

From: Charmley.William@epamail.epa.gov [mailto:Charmley.William@epamail.epa.gov]
Sent: Thursday, February 14, 2013 11:48 AM
To: Dow, Thomas (CarnCorp)
Cc: Michael Samulski <Samulski.Michael@epamail.epa.gov>
Subject: Re: Carnival Meeting in DC

Tom,

Sorry for not getting back with you earlier this week.

We are checking calendars at both epa and coast guard. I am focusing on Tuesday the 26th.

I hope to be able to send you available times later today.

Thanks
Bill

From: "Dow, Thomas (CarnCorp)" [TDow@carnival.com]
Sent: 02/13/2013 08:34 PM GMT
To: William Charmley
Subject: Carnival Meeting in DC

Bill,
This is follow-up on our call last week, to see if you have been able to pin down a date for a meeting in DC the week of February 25.
Tuesday Feb 26 is the best day for us, but we would make it work for another day that week.

We are still shooting to have a document to you by the middle of next week.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 5/20/2013 7:01:29 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: USCG & EPA Call - Carnival ECA Regulation 3 Scrubber Exemption

Bill
I'm on a flight this afternoon, boarding in 30 minutes. Arriving DC at 9pm. Perhaps tomorrow?
Thanks
Tom

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Charmley, William [mailto:charmley.william@epa.gov]
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Tom -

Can I call you on my drive home this evening, say around 5:15 or 5:30?

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To: Charmley, William
Cc: paul.topping@tc.gc.ca; Samulski, Michael
Subject: USCG & EPA Call - Carnival ECA Regulation 3 Scrubber Exemption

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I would be grateful for any input from either of you on alternative next steps.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

On May 17, 2013, at 12:52 PM, "Charmley, William"
<charmley.william@epa.gov<mailto:charmley.william@epa.gov>> wrote:

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Thanks
Bill

Bill Charmley
Acting Director
Assessment and Standards Division
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desk ph. 734-214-4466
cell ph. 734-545-0333
e-mail: charmley.william@epa.gov<mailto:charmley.william@epa.gov>

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, May 17, 2013 3:42 PM
To: 'Charles.K.Fluke@uscg.mil<mailto:Charles.K.Fluke@uscg.mil>'; Charmley, William
Subject: Re: Phone conn w/Carnival, USCG & EPA to discuss MARPOL Annex VI proposal

LCDR Fluke,
Did you intend to invite Paul Topping from Transport Canada?
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Sent: Friday, May 17, 2013 03:32 PM
To: Dow, Thomas (CarnCorp); Kaczmarek, Michael (CarnCorp); Thomas, Paul F CAPT <Paul.F.Thomas@uscg.mil<mailto:Paul.F.Thomas@uscg.mil>>; McAvoy, Kyle P CAPT <Kyle.P.McAvoy@uscg.mil<mailto:Kyle.P.McAvoy@uscg.mil>>; Mauger, John W CAPT <John.W.Mauger@uscg.mil<mailto:John.W.Mauger@uscg.mil>>; Lantz, Jeffrey G SES <Jeffrey.G.Lantz@uscg.mil<mailto:Jeffrey.G.Lantz@uscg.mil>>; Zamperini, Michael B CDR <Michael.B.Zamperini@uscg.mil<mailto:Michael.B.Zamperini@uscg.mil>>; Marcy, Chris K CDR <Chris.K.Marcy@uscg.mil<mailto:Chris.K.Marcy@uscg.mil>>; Nicholson, Jeanmarie <Jeanmarie.Nicholson@uscg.mil<mailto:Jeanmarie.Nicholson@uscg.mil>>; 'Samulski.Michael@epamail.epa.gov<mailto:Samulski.Michael@epamail.epa.gov>' <Samulski.Michael@epamail.epa.gov<mailto:Samulski.Michael@epamail.epa.gov>>; 'aranda.amber@epamail.epa.gov<mailto:aranda.amber@epamail.epa.gov>' <aranda.amber@epamail.epa.gov<mailto:aranda.amber@epamail.epa.gov>>; 'Epp.Timothy@epamail.epa.gov<mailto:Epp.Timothy@epamail.epa.gov>' <Epp.Timothy@epamail.epa.gov<mailto:Epp.Timothy@epamail.epa.gov>>; 'Revelt.Jean-Marie@epamail.epa.gov<mailto:Revelt.Jean-Marie@epamail.epa.gov>' <Revelt.Jean-Marie@epamail.epa.gov<mailto:Revelt.Jean-Marie@epamail.epa.gov>>; 'charmley.william@epa.gov<mailto:charmley.william@epa.gov>' <charmley.william@epa.gov<mailto:charmley.william@epa.gov>>
Subject: Phone conn w/Carnival, USCG & EPA to discuss MARPOL Annex VI proposal

When: Monday, May 20, 2013 11:00 AM-12:00 PM (GMT-05:00) Eastern Time (US & Canada).
Where: TBD
Note: The GMT offset above does not reflect daylight saving time adjustments.
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Captain's et al,
The following date and time has been scheduled for a conference call between the US Gov't (USCG/EPA) and Carnival to discuss their Annex VI exemption proposal.

If you are aware of any attendees I may have missed, please forward this invite on my behalf.
Date: 20 May

Time: 11:00
Teleconference Info:
Phone in number: Ex. 6 Personal Privacy (PP)
Leader access code (USCG - Capt Thomas): Ex. 6 Personal Privacy (PP) Participants access: Ex. 6 Personal Privacy (PP)

Captain Mauger, is your conf room available for USCG members to meet/collectively call in from?

Respectfully,
Chuck

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 12/1/2014 5:44:15 AM
To: Jeff Lantz [Jeffrey.G.Lantz@uscg.mil]; Charmley, William [charmley.william@epa.gov]
CC: Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Subject: Carnival CG/CVC Policy Letter 12-04; EGC Briefing to EPA & USCG
Attachments: Coast Guard ECA Policy Memo.pdf; ATT00001.htm

Jeff and Bill,
See below request for a request for a meeting to discuss steps toward approval of Carnival EGCS (scrubbers). We are working with Mike Samulski and designated USCG representatives, but I wanted you to know that some ships are very near operating systems to comply under Regulation 4 Equivalency.

I hope you are both well and had a nice Thanksgiving.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

From: Kaczmarek, Michael (CarnCorp)
Sent: Tuesday, November 25, 2014 6:04 PM
To: 'samulski.michael@epa.gov<mailto:samulski.michael@epa.gov>'
Cc: Dow, Thomas (CarnCorp); michael.P.Rand@uscg.mil<mailto:michael.P.Rand@uscg.mil>; michael.D.Lendvay@USCG.mil<mailto:michael.D.Lendvay@USCG.mil>; 'john.g.peterson@uscg.mil<mailto:john.g.peterson@uscg.mil>'
Subject: CG/CVC Policy Letter 12-04; EGC Briefing to EPA & USCG

Dear Mike;
The attached Policy Memo requires (in Article 5.b.ii.) that flag Administrations coordinate with ECA states before approving equivalencies; and specifically that the US EPA and USCG review and acknowledge such proposals in writing as acceptable.

As we are working through EGC system preparations for commissioning and flag surveys in several ships in the coming weeks, we think the timing might be right for an update briefing on these systems to both the EPA and USCG. This would show where we are in the system technical development process, better familiarize potential reviewing officers with our system and performance, and hopefully pave the way for an expeditious review and acceptance of our proposals for flag Administration approval.

Regret the very short notice but, if you agree, we would propose briefing a joint EPA/USCG meeting in Washington early next week. Monday or Tuesday is preferred if possible, due to travel conflicts later.

Thanks for your assistance and best regards,

Mike Kaczmarek

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 5/17/2013 7:55:05 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Phone conn w/Carnival, USCG & EPA to discuss MARPOL Annex VI proposal

Thanks Bill. I just wanted to ensure it wasn't inadvertent.
Tom
Tom

Sent from Tom Dow's Blackberry

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Friday, May 17, 2013 03:52 PM
To: Dow, Thomas (CarnCorp); 'Charles.K.Fluke@uscg.mil' <Charles.K.Fluke@uscg.mil>
Subject: RE: Phone conn w/Carnival, USCG & EPA to discuss MARPOL Annex VI proposal

Tom --

Mike Samulski did reach out to Paul this past week, apparently Monday is a public holiday in Canada. Given our challenges in finding a date and time that worked for everyone, Paul was okay with Coast Guard and EPA having this next discussion without Transport Canada.

Thanks
Bill

Bill Charmley
Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
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desk ph. 734-214-4466
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e-mail: charmley.william@epa.gov

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Subject: Re: Phone conn w/Carnival, USCG & EPA to discuss MARPOL Annex VI proposal

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Did you intend to invite Paul Topping from Transport Canada?
Tom

Sent from Tom Dow's Blackberry

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Sent: Friday, May 17, 2013 03:32 PM
To: Dow, Thomas (CarnCorp); Kaczmarek, Michael (CarnCorp); Thomas, Paul F CAPT <Paul.F.Thomas@uscg.mil>; McAvoy, Kyle P CAPT <Kyle.P.McAvoy@uscg.mil>; Mauger, John W CAPT <John.W.Mauger@uscg.mil>; Lantz, Jeffrey G SES <Jeffrey.G.Lantz@uscg.mil>; Zamperini, Michael B CDR <Michael.B.Zamperini@uscg.mil>; Marcy, Chris K CDR <Chris.K.Marcy@uscg.mil>; Nicholson, Jeanmarie <Jeanmarie.Nicholson@uscg.mil>; 'Samulski.Michael@epamail.epa.gov' <Samulski.Michael@epamail.epa.gov>; 'aranda.amber@epamail.epa.gov' <aranda.amber@epamail.epa.gov>; 'Epp.Timothy@epamail.epa.gov' <Epp.Timothy@epamail.epa.gov>; 'Revelt.Jean-Marie@epamail.epa.gov' <Revelt.Jean-Marie@epamail.epa.gov>; 'charmley.william@epa.gov' <charmley.william@epa.gov>
Subject: Phone conn w/Carnival, USCG & EPA to discuss MARPOL Annex VI proposal

When: Monday, May 20, 2013 11:00 AM-12:00 PM (GMT-05:00) Eastern Time (US & Canada).
Where: TBD
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If you are aware of any attendees I may have missed, please forward this invite on my behalf.
Date: 20 May
Time: 11:00
Teleconference Info:

Ex. 6 Personal Privacy (PP)

Captain Mauger, is your conf room available for USCG members to meet/collectively call in from?

Respectfully,
Chuck

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 10/29/2013 11:40:36 AM
To: Charmley, William [charmley.william@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]
Subject: Re: Carnival Draft letter from USCG and EPA

Bill
Either time Wed works for me.
Thanks.
Tom

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Tuesday, October 29, 2013 07:30 AM
To: Dow, Thomas (CarnCorp); Iffland, JoNell <Iffland.JoNell@epa.gov>
Cc: Samulski, Michael <samulski.michael@epa.gov>
Subject: Re: Carnival Draft letter from USCG and EPA

JoNell,

Can you send to Tom all of my available times on Wednesday. It looks like I am available from 1-2 and from 3-5pm. I would like to schedule a meeting with Tom Dow, and if possible his colleage Mike K. Please invite Mike and Alan Stout to the time we settle on. I believe Mike is on leave on Wednesday.

Tom - hopefully we can meet on Wednesday and then I will talk with Chris Grundler.

Thanks
Bill

From: Dow, Thomas (CarnCorp) <TDow@carnival.com>
Sent: Monday, October 28, 2013 8:54:50 PM
To: Charmley, William
Cc: Samulski, Michael
Subject: Re: Carnival Draft letter from USCG and EPA

Bill and Mike,
Im sorry we didn't connect today. I'm available tomorrow after 10:00am and Wednesday. Mike Kaczmarek is also available tomorrow. I am traveling Thursday and may not have cell coverage Friday.

I hope we have an opportunity for a call in the next two days.
Thanks,

Tom

Sent from my iPad

On Oct 25, 2013, at 5:18 PM, "Charmley, William"
<charmley.william@epa.gov<mailto:charmley.william@epa.gov>> wrote:

Dear Tom and Mike -

Mike Samulski has been keeping me up to speed regarding the status of the draft EPA/Coast Guard letter on the program permit. I met with Mike this afternoon to review the final letter, so I could then get my Office Director Chris Grundler's signature.

However, after reviewing the revised ship schedule, I am concerned about the emissions impact related to a change in the ship installation schedule as reflected in the revised Attachment 1 of the draft letter. Our understanding was that there were going to be five vessels upgraded to use exhaust gas cleaning technology by the summer of 2014. Now the first installation would not begin until almost a year from now. Also, there a seems to be a large shift of drydock dates to December 2015, where before their was only a single vessel in December of 2015, there are now eight. At an initial review it looks as though the changes in the revised schedule from Carnival go in the direction of a meaningful increase in sulfur emissions compared to what we reviewed this past summer.

I need to understand why these changes have been made, so I can explain to Chris what is going on before I ask him to sign a letter.

Can we schedule some time for a conference call next week to discuss these changes?

Best regards,

Bill Charmley

Director
Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
2000 Traverwood Drive
Ann Arbor, MI 48105

desk ph. 734-214-4466
cell ph. 734-545-0333
e-mail: charmley.william@epa.gov<mailto:charmley.william@epa.gov>

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Thursday, October 24, 2013 2:15 PM
To: Samulski, Michael; Charmley, William
Cc: Kaczmarek, Michael (CarnCorp)
Subject: Carnival Draft letter from USCG and EPA

Mike
Carnival has no concerns with the draft letter.

The attached Word document includes the current ship schedule in Attachment 1. The PDF shows Attachment 1 in the format previously provided to USCG and EPA.
The Exemption Request Template is the same one you sent yesterday.

The EPA/USCG letter in July prompted R&D scheduling activity as well as focus by itinerary planners to keep ships within or bring ships back to the NA ECA. The revised ship list reduces 2016 installations from 7 ships to 3 ships. The list includes 26 of the original 32 ships, with 6 ships changed to reflect itinerary, drydock or wet dock schedule changes. We will continue to look for ways to accelerate installation.

Please proceed with processing for signature, and provide a copy to me when you send it electronically.
Thanks and regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

From: Samulski, Michael [mailto:samulski.michael@epa.gov]
Sent: Wednesday, October 23, 2013 10:13 PM
To: Dow, Thomas (CarnCorp)
Cc: Charmley, William
Subject: Draft letter from USCG and EPA

Tom,

We and USCG have completed the draft letter on the trial program. However, prior to finalizing the letter, I wanted to share it with you to see if you have any feedback. The draft letter is attached.

If this raises no concerns, we will start processing it for signature.

Best regards,

Mike

****
Michael Samulski
U.S. Environmental Protection Agency

Office of Transportation and Air Quality
Director, Large Marine and Aircraft Center
1 (734) 214-4532
samulski.michael@epa.gov<mailto:samulski.michael@epa.gov>
****

<Carnvial NA ECA exemption ships list as of 4Oct2013.pdf>

Message

From: tdow@carnival.com [TDow@carnival.com]
Sent: 2/14/2013 11:00:06 PM
To: Charmley, William [charmley.william@epa.gov]
CC: Samulski, Michael [samulski.michael@epa.gov]; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Evans, Eric (CarnCorp) [EEvans@carnival.com]
Subject: RE: Carnival Meeting in DC

Bill.
Thanks for your note and your efforts to arrange the meeting.

Mike Kaczmarek and I will plan on Tuesday, February 26 from 3-5pm unless we hear otherwise from Mike or you.
Next week we will send electronically to both of you an outline of the Carnival proposal so you have it in advance of the meeting.
Eric Evans, Carnival's VP in charge of fuel supply may also attend. So there may be three of us from Carnival.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

From: Charmley.William@epamail.epa.gov [mailto:Charmley.William@epamail.epa.gov]
Sent: Thursday, February 14, 2013 5:21 PM
To: Dow, Thomas (CarnCorp)
Cc: Michael Samulski
Subject: Re: Carnival Meeting in DC

Tom -

I have not yet heard back from Coast Guard, but please put a hold on 3-5pm on Tuesday, Feb 26 - that is what I offered to them and what works for EPA staff. I also asked if the Coast Guard would like to host the meeting in D.C. I am sure we will hear back from them soon.

I will be on vacation starting tomorrow and next week. I will be checking emails, but I'm going to ask Mike to take the lead on scheduling this meeting - Mike will be get the information back from Coast Guard regarding the 26th and can let you know if we can lock that in. If not, Mike will work with you and Coast Guard to find an alternative date/time.

Best regards,
Bill

From: William Charmley/AA/USEPA/US
To: "Dow, Thomas (CarnCorp)" <TDow@carnival.com>
Cc: "Michael Samulski" <Samulski.Michael@epamail.epa.gov>
Date: 02/14/2013 11:48 AM
Subject: Re: Carnival Meeting in DC

Tom,

Sorry for not getting back with you earlier this week.

We are checking calendars at both epa and coast guard. I am focusing on Tuesday the 26th.

I hope to be able to send you available times later today.

Thanks
Bill

From: "Dow, Thomas (CarnCorp)" [TDow@carnival.com]
Sent: 02/13/2013 08:34 PM GMT
To: William Charmley
Subject: Carnival Meeting in DC

Bill,
This is follow-up on our call last week, to see if you have been able to pin down a date for a meeting in DC the week of February 25. Tuesday Feb 26 is the best day for us, but we would make it work for another day that week.

We are still shooting to have a document to you by the middle of next week.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: tdow@carnival.com [TDow@carnival.com]
Sent: 2/14/2013 4:52:03 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Carnival Meeting in DC

Thanks Bill

Sent from Tom Dow's Blackberry

From: Charmley.William@epamail.epa.gov [mailto:Charmley.William@epamail.epa.gov]
Sent: Thursday, February 14, 2013 11:48 AM
To: Dow, Thomas (CarnCorp)
Cc: Michael Samulski <Samulski.Michael@epamail.epa.gov>
Subject: Re: Carnival Meeting in DC

Tom,

Sorry for not getting back with you earlier this week.

We are checking calendars at both epa and coast guard. I am focusing on Tuesday the 26th.

I hope to be able to send you available times later today.

Thanks
Bill

From: "Dow, Thomas (CarnCorp)" [TDow@carnival.com]
Sent: 02/13/2013 08:34 PM GMT
To: William Charmley
Subject: Carnival Meeting in DC

Bill,
This is follow-up on our call last week, to see if you have been able to pin down a date for a meeting in DC the week of February 25.
Tuesday Feb 26 is the best day for us, but we would make it work for another day that week.

We are still shooting to have a document to you by the middle of next week.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 4/25/2013 5:23:52 AM
To: Charmley, William [charmley.william@epa.gov]
Subject: Call today

Bill,
Sorry for the delay in calling back. I'm in San Francisco at an AAPA conference and just retrieved my office voicemails. I will call you in the morning around 10 your time, 7am Pacific time. Please email if another time is better for you.
Regards,

Tom Dow

Sent from my iPad

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 3/9/2013 8:33:04 PM
To: Charmley, William [charmley.william@epa.gov]
CC: paul.topping@tc.gc.ca; Kaczmarek, Michael (CarnCorp) [MKaczmarek@carnival.com]; Jeffrey.G.Lantz@uscg.mil
Subject: Carnival North America ECA Request

Bill,
I spoke yesterday with Paul Topping and sent him the information that we provided to you regarding Carnival's Regulation 3 Scrubber proposal. Paul has agreed that Transport Canada will honor the Confidential Business Information request.

I told Paul that Carnival would be providing more information to EPA and USCG and we will provide copies to Transport Canada at the same time. We expect to have this before the end of March, and will request another meeting or call. In the meantime, please feel free to contact Paul regarding this matter.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Monday, March 04, 2013 9:39 PM
To: Dow, Thomas (CarnCorp); Kaczmarek, Michael (CarnCorp); Evans, Eric (CarnCorp)
Cc: Samulski, Michael; Jeffrey.G.Lantz@uscg.mil
Subject: RE: Carnival North America ECA Request - Feb 26 Meeting

Tom,

I wanted to thank you, Mike and Eric for the very helpful meeting last week with EPA and Coast Guard.

One question I had for you is the following. As you may know, Transport Canada is an important stakeholder for EPA and Coast Guard with respect to the implementation of the North American ECA. We have found in the past year that it can be helpful if EPA/Coast Guard keep our colleagues at Transport Canada informed of our activities regarding the implementation of the ECA, including potential applications of Regulation 3 which can impact vessels which also are used in Canadian areas of the ECA.

One of our principle points of contact at Transport Canada is Mr. Paul Topping.

Would Carnival consider sharing the information which you sent to EPA and Coast Guard with Transport Canada? We have not yet had a dialog with them regarding our discussions with Carnival, as we consider much of the information to be Confidential Business Information -- but it could be helpful for both Carnival and EPA and Coast Guard if you all shared this information with them, which would allow us to have a dialog with our counterparts in Canada.

Please let me know what you think regarding this request.

Best regards,

Bill Charmley

Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
2000 Traverwood Drive
Ann Arbor, MI 48105

desk ph. 734-214-4466
cell ph. 734-545-0333
e-mail: charmley.william@epa.gov

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, February 20, 2013 6:18 PM
To: Charmley, William; Samulski, Michael
Cc: Kaczmarek, Michael (CarnCorp); Evans, Eric (CarnCorp)
Subject: Carnival North America ECA Request - Feb 26 Meeting

Bill and Mike,
Attached are documents for discussion when we meet in Washington, DC next week. Please forward to Captain Lantz and others as appropriate. Please note that Attachments are marked Confidential Business Information.

Mike Kaczmarek, Eric Evans and I look forward to the discussions next Tuesday.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: tdow@carnival.com [TDow@carnival.com]
Sent: 2/8/2013 2:39:00 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Availability for a call - ECA

Will do.
Thanks Bill
Tom

Sent from Tom Dow's Blackberry

From: Charmley.William@epamail.epa.gov [mailto:Charmley.William@epamail.epa.gov]
Sent: Friday, February 08, 2013 09:32 AM
To: Dow, Thomas (CarnCorp)
Subject: Re: Availability for a call - ECA

Tom,

please call me at Ex. 6 Personal Privacy (PP) at 5pm eastern today.

thanks
Bill

From: "Dow, Thomas (CarnCorp)" <TDow@carnival.com>
To: William Charmley/AA/USEPA/US@EPA
Date: 02/08/2013 09:18 AM
Subject: Re: Availability for a call - ECA

Bill
5pm works. What phone #? Stay warm.
Thanks.
Tom

Sent from Tom Dow's Blackberry

From: Charmley.William@epamail.epa.gov [mailto:Charmley.William@epamail.epa.gov]
Sent: Friday, February 08, 2013 09:01 AM
To: Dow, Thomas (CarnCorp)
Subject: Re: Availability for a call - ECA

Tom -

We received enough snow last night in Michigan (**Ex. 6 Personal Privacy (PP)**

Ex. 6 Personal Privacy (PP)

Would 5pm eastern time work for you? if not, I could find a time in the mid-afternoon, but it would be tough for it to be more than 10 or 15 minutes. At 5pm I could do 30 or 45 minutes.

Let me know what might work.

thanks
Bill

==========

Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
2000 Traverwood Drive
Ann Arbor, MI 48105

desk ph. 734-214-4466
cell ph. 734-545-0333
fax. 734-214-4816
e-mail: charmley.william@epa.gov

From: "Dow, Thomas (CarnCorp)" <TDow@carnival.com>
To: William Charmley/AA/USEPA/US@EPA
Date: 02/08/2013 08:50 AM
Subject: Availability for a call - ECA

Bill,
Are you available for a quick call later today to discuss ECA?
Any time after 11:00am EST. 10-15 minutes should be adequate.
We are preparing a Carnival ECA proposal for your consideration.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 8/14/2013 8:40:18 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Carnival Statement

Thanks Bill. I will be on cell tomorrow, still on the West Coast.
Thanks.
Tom

Sent from Tom Dow's Blackberry

----- Original Message -----
From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Wednesday, August 14, 2013 04:38 PM
To: Dow, Thomas (CarnCorp)
Subject: Re: Carnival Statement

Tom

I won't be able to call you today, already on a plane to fly back to michigan.

I will call you tomorrow.

There is a very high likelihood epa will want to do a coordinated press release with carnival. I will find out for certain tomorrow, and should hear back from coast guard tomorrow as well.

Thanks
Bill

_____
From: Dow, Thomas (CarnCorp) <TDow@carnival.com>
Sent: Monday, August 12, 2013 11:12:43 AM
To: Charmley, William
Subject: Carnival Statement

Bill,
Pasted below is the draft statement that we discussed.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

>>
>> Carnival ECA Statement
>> August XX, 2013
>>
>> Miami -- Carnival Corporation, the world's largest cruise company, today announced it has received the support of the U.S. Environmental Protection Agency, the U.S. Coast Guard and Transport Canada to implement a significant advancement in environmental technology designed to reduce air emissions from cruise ships and large marine vessels.

>> As part of today's announcement, Carnival has committed over $150 million for exhaust gas cleaning technology on 32 ships. These include vessels from Carnival Cruise Lines, Holland America Line, Princess Cruises and Cunard Line that sail regularly within the North American Emission Control Area (ECA).

>> "This is a significant accomplishment as well as an important milestone for our company," said Carnival CEO Arnold Donald. "Working together with the EPA, U.S. Coast Guard, and Transport Canada, we have developed a breakthrough solution for cleaner air that will set a new course in environmental protection for years to come."

>> Carnival has been a partner in the development of this technology and will take the lead in further refining both design and installation aspects on ships with a variety of engine configurations between now and mid-2016. This new generation of scrubber technology combines the removal of sulfur with substantial reduction of particulate matter (PM), as well as delivering other environmental benefits.

>> The design combines two established technologies, which have been successfully used in power plants, factories and vehicles to clean – or scrub – the exhaust from high-sulfur fuel. For the first time this combination is being developed to accommodate restricted spaces on existing ships.

>> Carnival's technology solution will allow the company to meet emission standards while controlling fuel costs. The International Maritime Organization's MARPOL Annex VI places a cap on sulfur within ECA's at 1.0%, which took effect in North America in 2012. In 2015, the limit will be 0.1%.

>> Ultimately, Carnival plans to expand scrubber installation beyond the 32 ships that are included in this development project.
>>
>> Carnival Corporation & plc is the largest cruise company in the world, with a portfolio of cruise brands in North America, Australia and Asia, comprised of Carnival Cruise Lines, Holland America Line, Princess Cruises, Seabourn, AIDA Cruises, Costa Cruises, Cunard, Ibero Cruises, P&O Cruises (Australia) and P&O Cruises (UK).
>> Together, these brands operate 102 ships totaling 209, 000 lower berths with seven new ships scheduled to be delivered between May 2014 and April 2016. Carnival Corporation & plc also operates Holland America Princess Alaska Tours, the leading tour company in Alaska and the Canadian Yukon. Traded on both the New York and London Stock Exchanges, Carnival Corporation & plc is the only group in the world to be included in both the S&P 500 and the FTSE 100 indices.
>>
>> ###

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 7/24/2013 9:20:01 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: RE: Attendees from Carnival for Thursday's meeting

Bill,
Mike Kaczmarek and I will attend in person. Stein Kruse, CEO of Holland America Line will call in from Seattle.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Wednesday, July 24, 2013 4:25 PM
To: Dow, Thomas (CarnCorp)
Subject: Attendees from Carnival for Thursday's meeting

Tom –

I understand that Carnival will be meeting with Chris Grundler and Jeff Lantz tomorrow at 3-4pm at Chris's offices in D.C.

Can you confirm for me who will participate from Carnival, both in person and by phone?

Thanks
Bill

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 8/12/2013 4:34:56 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: Re: Checking in

Bill
That works for me I'm on cell this week, working from the West Coast. Ex. 6 Personal Privacy (PP)
Thanks,

Tom

Sent from my iPad

On Aug 12, 2013, at 9:32 AM, "Charmley, William" <charmley.william@epa.gov> wrote:

> Tom -
>
> I will be on travel this afternoon from about 2pm until late.
>
>
> I can call you on my drive to the airport if that works, it would be at about 1:20 or 1:30.
>
>
> If that works, what number should I call you at?
>
>
> Thanks
> Bill
>
>
>
>
> -----Original Message-----
> From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
> Sent: Monday, August 12, 2013 12:21 PM
> To: Charmley, William
> Subject: Checking in
>
> Bill
> Are you available for a call today?
> Tom
>
> Sent from my iPad

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 7/22/2013 11:22:27 AM
To: Charmley, William [charmley.william@epa.gov]; Stewart, Gwen [Stewart.Gwen@epa.gov]
CC: Stewart, Lori [Stewart.Lori@epa.gov]; Iffland, JoNell [Iffland.JoNell@epa.gov]
Subject: RE: Meeting with Carnival

Thanks, Bill.
Gwen, if at all possible we request Thursday, July 25th.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

-----Original Message-----
From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Sunday, July 21, 2013 10:46 PM
To: Stewart, Gwen; Dow, Thomas (CarnCorp)
Cc: Stewart, Lori; Iffland, JoNell
Subject: Meeting with Carnival

Gwen -

Chris would like to have a meeting with representative from the company Carnival later this week. Chris said we should make this a high priority and do what we can to accommodate this meeting. If you can work with Tom Dow from Carnival to set up this meeting I would appreciate it. Tom's email address (I have copied Tom on this message) is:

tdow@carnival.com

We would like to target this upcoming Thursday, July 25 or Friday, July 26, while Chris is in D.C.

Please also invite Mr. Jeff Lantz from the Coast Guard - I have let Jeff know about this meeting request. Jeff's email address is:

jeffery.g.lantz@uscg.mil

I should note that I am on travel all day on Thursday, but that should not matter. If Thursday works best, we should schedule this for Thursday and I will try to participate by phone.

Please let me know if you have any question on this.

Thanks
Bill

Appointment

From: Stewart, Gwen [Stewart.Gwen@epa.gov]
Sent: 7/22/2013 4:26:14 PM
To: Charmley, William [charmley.william@epa.gov]; Jeffrey.g.Lantz@uscg.mil; tdow@carnival.com
CC: Stewart, Lori [Stewart.Lori@epa.gov]; Stewart, Gwen [Stewart.Gwen@epa.gov]; Iffland, JoNell [Iffland.JoNell@epa.gov]

Subject: CONFIRMED: Carnival with T. Dow and J. Lantz
Location: RM. 6520 DC/ By Telephone: Ex. 6 Personal Privacy (PP)

Start: 7/25/2013 7:00:00 PM
End: 7/25/2013 8:00:00 PM
Show Time As: Tentative

MEETING PARTICIPANTS:

Gwen,
Stein Kruse is confirmed to call in.
Regards,

Tom Dow

> -----Original Message-----
> From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
> Sent: Monday, July 22, 2013 10:54 AM
> To: Stewart, Gwen
> Subject: Re: Meeting with Carnival
>
> Gwen,
> We can confirm that July 25 from 3-4pm works for us. Mike Kaczmarek and I will attend in person.
>
> I am checking on Stein Kruse's availability to call in from Seattle. Stein is CEO of Holland America Line and is the lead CEO in the ECA-EPA proposal. I will confirm his participation later today.
>
> Thank you for your assistance.
> Regards,
>
> Tom Dow
> Vice President, Public Affairs
> Carnival North America LLC
> Washington, DC

Gwen - if Tom Dow comes in to meet Chris, I would like to attend in person if that would be OK.

Jeff

MEETING REQUEST:

Gwen -

Chris would like to have a meeting with representative from the company Carnival later this week. Chris said we should make this a high priority and do what we can to accommodate this meeting. If you can work with Tom Dow from Carnival to set up this meeting I would appreciate it. Tom's email address (I have copied Tom on this message) is:

tdow@carnival.com

We would like to target this upcoming Thursday, July 25 or Friday, July 26, while Chris is in D.C.

Please also invite Mr. Jeff Lantz from the Coast Guard - I have let Jeff know about this meeting request. Jeff's email address is:

jeffery.g.lantz@uscg.mil

I should note that I am on travel all day on Thursday, but that should not matter. If Thursday works best, we should schedule this for Thursday and I will try to participate by phone.

Please let me know if you have any question on this.

Thanks
Bill

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 7/19/2013 7:31:03 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: RE: Carnival NA ECA exemption requested information

Thanks, Bill.
I'm available this afternoon or this evening in DC, and Monday morning after 09:30 on cell.
Tom

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Friday, July 19, 2013 3:28 PM
To: Dow, Thomas (CarnCorp)
Subject: RE: Carnival NA ECA exemption requested information

Tom –

I will try to call you later today with a status update.

I would also like to explore the possibility of having a few senior representatives from Carnival brief my Office Director Chris Grundler next week if possible on the Carnival plan. We have briefed Chris this week, and I think it would be very helpful if someone like Mike K. who is responsible for the overall project within the company could give Chris an overview of the project.

We can discuss that either later today or on Monday morning.

Thanks
Bill

From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, July 19, 2013 10:19 AM
To: Charmley, William
Subject: Carnival NA ECA exemption requested information

Bill,
You and your colleagues at EPA must be pleased and relieved that Gina McCarthy was finally confirmed as Administrator.

Now that you have had a few days to review the information sent Tuesday, I wanted to check in before the end of the week to see if you need anything further. Carnival Corporation had a meeting of all CEO's along with the Chairman and the new Corporate CEO this week in New York. I briefed the group on the status of the ECA Exemption proposal, and that we were hopeful of a favorable determination within a few weeks. They were receptive, but expressed great urgency that time was running out on itinerary decisions.

I am available if you wish to discuss.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

202.347.7150 Office
202.538.0431 Cell

****
****

Bill and Jeff,

Ex. 4 CBI

Please consider all as Business Confidential.

Please contact me if you have questions or require further information.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Ex. 4 CBI

Ex. 4 CBI

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 2/5/2014 6:59:34 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: RE: Call for Update on Carnival

Bill,
In addition to a general update on the project and the upcoming CARB meeting in Sacramento, I would like to discuss one issue with the Permit.

Pasted below is section D.5 (c) for your reference. I have learned that 40 CFR part 1065 1065 is something like 50 pages of detailed instructions for the testing of new diesel engines. You can see for yourself, it's on-line.

We would like to explore alternatives, considering that we will have continuous monitoring as part of the system.

I look forward to connecting today.
Regards,

Tom

D. General Provisions

5. Conditions of Permit- Emission Measurement.

c. Company shall perform tests with the installed exhaust gas cleaning system to characterize the Engine's PM and SOx emission levels upstream and downstream of the system. Applicable emission measurements shall be performed according to 40 CFR part 1065 and include at least five test points spanning the range of engine operating conditions

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Monday, February 03, 2014 11:21 AM
To: Dow, Thomas (CarnCorp)
Subject: Re: Call for Update on Carnival

Tom,

I am on the west coast and pretty busy until Wednesday - ok if I call you on Wednesday?

Thanks
Bill

From: Dow, Thomas (CarnCorp) <TDow@carnival.com>
Sent: Friday, January 31, 2014 6:27:08 AM
To: Charmley, William
Subject: Call for Update on Carnival

Bill,
Happy New Year and I hope you are managing through the winter weather. We have had a taste here in DC.

If you have a few minutes I would like to discuss the Carnival scrubber project. I have some updates on future plans as well as a planned meeting with CARB in Sacramento next month.

I'm in DC today and all of next week. Let me know a convenient time. Probably 15-20 minutes should be adequate.
Thanks,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Dow, Thomas (CarnCorp) [TDow@carnival.com]
Sent: 2/3/2014 4:52:07 PM
To: Charmley, William [charmley.william@epa.gov]
Subject: RE: Call for Update on Carnival

Sure Bill. Wednesday is fine. I will be in my DC office, so let me know what time works for you.
Thanks,

Tom

From: Charmley, William [mailto:charmley.william@epa.gov]
Sent: Monday, February 03, 2014 11:21 AM
To: Dow, Thomas (CarnCorp)
Subject: Re: Call for Update on Carnival

Tom,

I am on the west coast and pretty busy until Wednesday - ok if I call you on Wednesday?

Thanks
Bill

From: Dow, Thomas (CarnCorp) <TDow@carnival.com>
Sent: Friday, January 31, 2014 6:27:08 AM
To: Charmley, William
Subject: Call for Update on Carnival

Bill,
Happy New Year and I hope you are managing through the winter weather. We have had a taste here in DC.
If you have a few minutes I would like to discuss the Carnival scrubber project. I have some updates on future plans as well as a planned meeting with CARB in Sacramento next month.

I'm in DC today and all of next week. Let me know a convenient time. Probably 15-20 minutes should be adequate.
Thanks,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Charmley, William [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=FB1828FB00AF42FFB68B9E0A71626D95-CHARMLEY, WILLIAM]
Sent: 2/1/2013 1:09:06 PM
To: Evans, Eric (CarnCorp) [EEvans@carnival.com]
Subject: Re: telephone call

Eric

You can call me now any anytime upto 9am

My number is 734-545-0333

From: "Evans, Eric (CarnCorp)" [EEvans@carnival.com]
Sent: 02/01/2013 12:58 PM GMT
To: William Charmley
Subject: telephone call

Good morning Bill,
Would you have time today for a quick 10 minute phone call?
Please advise,
Thanks,
Eric

Eric Evans
Vice President
Carnival Corporation
305-406-4679

Message

From: Charmley, William [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=FB1828FB00AF42FFB68B9E0A71626D95-CHARMLEY, WILLIAM]
Sent: 7/31/2013 8:00:06 PM
To: tdow@carnival.com
Subject: RE: Time for a call today - at say 4pm or 5pm?

Yes, I will call at 4:15

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Wednesday, July 31, 2013 3:59 PM
To: Charmley, William
Subject: Re: Time for a call today - at say 4pm or 5pm?

Bill
I'm running late on a conference call. Can we make it 4:15?
Tom

Sent from my iPad

On Jul 31, 2013, at 12:49 PM, "Charmley, William" <charmley.william@epa.gov> wrote:

> Tom -
>
>
> I also wanted to send you the few paragraphs below in advance of our call. This comes from a transcript of the Carnival 3rd quarter investors call held on June 25 of this year.
>
>
> This has generated a fair amount of discussion with Coast Guard and EPA.
>
> This is not the main reason for my call, but it is related.
>
> Thanks
> Bill
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> ==========
> ====
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>
> Operator
> Our next question comes from the line of Ian Rennardson with Jefferies.
>
> Ian Rennardson - Jefferies & Company, Inc., Research Division
>
> I've got 2 lines of questioning for you, please, #1 is regarding the new CEO role. Did you search both internally and externally for the new CEO? What is the mandate? And do we really see any material shift in policy and strategy? Do you think we'll be adding more capacity than planned? And then the second revolves around the ECA, the oil price. But 2015 is not that far away, and your 10-K tells us you've got, in a worst case, $265 million of extra cost because of the low sulfur fuel requirement. Are you in a position to talk to us about how you can mitigate that, to what degree you can mitigate that? And if you can mitigate it, what the extra CapEx might be?
>
> Micky M. Arison - Chairman, Chief Executive Officer, Chairman of
> Executive Committee, Chairman of Carnival Plc and Chief Executive Officer of Carnival Plc Okay, let me first -- on the issue of the Chairman/CEO role, we've been talking -- I've been talking to the independent directors of the board for quite some time about where we go from here as far as corporate management and structure. We said 10 years ago in our discussions in the U.K. that we were totally committed to the DLC structure, very sensitive to U.K. governance and have moved in that direction over the years. And obviously, a key element of those discussions over the last 10 years has been splitting of the Chairman and CEO role. So I've been sensitive to that for quite some time. we've been talking about it for quite some time, myself and the -- and Stu Subotnick, who is the Lead Independent Director and Chairman of the Nominating Governance Committee, talked extensively with the committee about various candidates. We did not do a full -- we didn't hire consultants to do a full external search. We felt

very, very comfortable. I recommended Arnold as a choice and Stu, and the committee immediately supported that, as well as all the independent directors. So we felt we had the right candidate. There was no reason to go beyond that, and we're -- and I'm delighted that -- we didn't know when Stu called Arnold, whether it would be something he would entertain, and we were delighted he did, and that's the way -- that's the direction we went. Clearly, this ties much greater with the U.K. governance model than the U.S., but I think, even in the U.S., it's starting to move in this direction. So that's the way it all happened. As far as ECA?
>
>
> David Bernstein - Chief Financial Officer and Senior Vice President
> Yes. Thank you, Micky. Howard did mention in his notes that we had a scrubber on -- that is successfully operating on one of our ships, and we're going to put scrubbers on 2 more ships later this year and that we then expect to roll out the scrubber installations in 2014. We may not have every single ship equipped with scrubbers by January 1, 2015, but we'll clearly prioritize those ships that have the biggest impact. So in 2015, with the new ECA, we do believe we can mitigate a significant portion of that $265 million. We may not get it all in 2015, but we will get it all shortly thereafter as we do the installation. It's about $1 million to $1.5 million per engine. You got to do at least a couple of engines on each ship. So it is a significant amount of CapEx. But the numbers that we've been giving out for CapEx do include our anticipated scrubber CapEx as well. So those are already in the numbers you've heard Beth give out.
>
>
>
> -----Original Message-----
> From: Charmley, William
> Sent: Wednesday, July 31, 2013 3:19 PM
> To: tdow@carnival.com
> Subject: RE: Time for a call today - at say 4pm or 5pm?
>
> I will call you at 4pm eastern time on your cell.
>
>
> Thanks
> Bill
>
>
>
>
> -----Original Message-----
> From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
> Sent: Wednesday, July 31, 2013 3:15 PM
> To: Charmley, William
> Subject: Re: Time for a call today - at say 4pm or 5pm?
>
> Bill,
> I can call you, or call me on cell. I'm on west coast time. Let me know best time for you.
> Tom Dow
> Ex. 6 Personal Privacy (PP) Cell
>
> Sent from my iPad
>
> On Jul 31, 2013, at 12:09 PM, "Charmley, William"
<charmley.william@epa.gov<mailto:charmley.william@epa.gov>> wrote:
>
> Tom -
>
>
> Do you have time for a call later today at say 4pm or 5 pm?
>
>
> Thanks
> Bill
>
>
>
>
>
>

Message

From: Charmley, William [charmley.william@epa.gov]
Sent: 5/22/2013 9:40:35 PM
To: tdow@carnival.com
Subject: Re: Dates for June Carnival Meeting in DC REVISED REQUEST

Tom

We will check with coast guard and get back to you by cob tomorrow.

Thanks
Bill

From: Dow, Thomas (CarnCorp)
Sent: Wednesday, May 22, 2013 3:32:20 PM
To: Charmley, William
Subject: Dates for June Carnival Meeting in DC REVISED REQUEST

Bill,
June 6 is not good for Carnival's senior technical representative. I understand you are not available the week of June 10th.
We would propose the following week, June 17, 18 or 19, with Monday, June 17th being first choice. June 20-21 won't work for us.
Please advise if any of the dates can work for you.
Thanks,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Message

From: Charmley, William [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=FB1828FB00AF42FFB68B9E0A71626D95-CHARMLEY, WILLIAM]
Sent: 6/28/2013 4:40:37 PM
To: tdow@carnival.com
CC: Jeffrey.G.Lantz@uscg.mil
Subject: RE: Status of any revised Carnival concept on Regulation 3 SOx scrubber development program

Tom -

Thanks for the update. EPA and Coast Guard can compare calendars and we'll get back to you regarding some options for a conference call the week of July 8.

-----Original Message-----
From: Dow, Thomas (CarnCorp) [mailto:TDow@carnival.com]
Sent: Friday, June 28, 2013 10:58 AM
To: Charmley, William
Cc: Jeffrey.G.Lantz@uscg.mil
Subject: Re: Status of any revised Carnival concept on Regulation 3 SOx scrubber development program

Bill and Jeff,
The revision is taking a bit longer than I anticipated. We are confirming the details with drydock and itinerary planners from the various operating companies. We will finalize early nest week and I will send something to you next week.

Considering the 4th of July Holiday, I would request a conference call with you to discuss it July 9 or 10. This would give you a chance to review it.
Regards,

Tom Dow
Vice President, Public Affairs
Carnival North America LLC
Washington, DC

Sent from my iPad

On Jun 27, 2013, at 9:07 AM, "Charmley, William"
<charmley.william@epa.gov<mailto:charmley.william@epa.gov>> wrote:

Tom -

Can you provide Jeff and I with an update on the timing of a revised Carnival concept for a regulation 3 SOx scrubber development program for the North American ECA?

My recollection from our phone discussion on June 17 was that Carnival is developing a revised approach, and the company hopes to have that available to share with Coast Guard and EPA by the end of June.

Any updates you can provide us with on the timing of the revised approach would be much appreciated.

Best regards,
Bill

Bill Charmley
Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
2000 Traverwood Drive

Ann Arbor, MI 48105

desk ph. 734-214-4466
cell ph. 734-545-0333
e-mail: charmley.william@epa.gov<mailto:charmley.william@epa.gov>

Message

From: Charmley, William [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=FB1828FB00AF42FFB68B9E0A71626D95-CHARMLEY, WILLIAM]
Sent: 6/27/2013 4:07:27 PM
To: Dow, Thomas (CarnCorp) [TDow@carnival.com]
CC: Jeffrey.G.Lantz@uscg.mil
Subject: Status of any revised Carnival concept on Regulation 3 SOx scrubber development program

Tom –

Can you provide Jeff and I with an update on the timing of a revised Carnival concept for a regulation 3 SOx scrubber development program for the North American ECA?

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Any updates you can provide us with on the timing of the revised approach would be much appreciated.

Best regards,
Bill

Bill Charmley
Acting Director
Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

National Vehicle and Fuel Emissions Laboratory
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