

Revision 0:		
Date	Subject	Misc.
8/2/18	Start /Draft Document (on going)	-
10/3/18	Completed Document (All OR Reports Reviewed /processed)	-

Background:

In 2018 vessel in the Alaska trade utilized at a large scale the Exhaust Gas Cleaning Systems (EGCS) installation to reduce the SOx emissions.

The SOx emissions are limited in the established Sulfur Emissions Control Areas (SECA). This is a Federal, and International Law. Virtually all Alaskan waters in which the cruise vessels operate are in the SECA. To comply with these Sulfur emissions there are two options the vessel can chose from to be in compliance with the law:

1. The use of a fuel with a low sulfur content with a Sulfur content not to exceed 0.1 % S by wt. This is an distillate fuel type often called “MGO” (Marine Gas Oil”) or more specially “LSMGO” (Low Sulfur Marine Gas Oil); or
 2. The use of a fuel with a sulfur content that exceeds the Sulfur content of 0.1 % S by wt., in combination with SOx Controls. This is a residual fuel often called “HFO” (Heavy Fuel Oil) or “IFO” (Intermediate Fuel Oil). The combustion gases are treated by and Exhaust Gas Cleaning System (EGCS) also named “scrubbers”.
- during the 2018 Cruise season were reported HFO / IFO fuels with a Sulfur content in the range of 1.7 to 2.3 % Sulfur by wt. It should be noted that in some occasions fuel sulfur contents were reports as low 1.2% S by wt.

The Port of Seattle (WA) and Vancouver (BC) are the most used HFO and MGO fuel bunker ports for the AK trade. MGO fuels may get bunkered in Alaska as well. Alaska bunker ports for MGO were in 2018 the Port of Seward, Ketchikan, and Whittier).

Note: The SECA already caps the Sulfur content worldwide for distillate fuels / or Residual fuels with a sulfur cap; the Sulfur cap for the Residual /Heavy fuels is set at maximum 3.5 % S by wt. After 2020 this HFO Fuel Sulfur cap will be reduced to a 0.5 % S by wt.

In 2018 the Ocean Ranger’s (OR) observed and reported on a regular basis the EGCS discharge appearance. This overview include the following main elements:

- The reported EGCS systems with sheen / oil issues / discharges with discolorifications etc.
- The OR follow up actions on these observations
- ADEC CPVEC follow up with the vessels / owners /operators; and
- The vessel responses / feedback on ADEC CPVEC follow up actions.

The ADEC CPVEC Follow Up actions included event specific questions according the “What Where and When” principle, including the request for current EGCS discharge status and actions taken to avoid re-occurrence of events.

Table A include a brief overview of the 2018 vessels that were reported by the OR to have EGCS sheen discharges. Table B include a detailed summary overview of the vessels with EGCS discharge sheen issues. The information in this table is summarized and obtained from the follow up responses from the vessels. ADEC CPVEC → Vessel. Table C provides an overview of the observed EGCS discharge sheen Events in AK Ports / Areas. Table D include a summery / overview of the OR reported EGCS technology and operational information. Table E list the observed / reported EGCS items related to the regulatory compliance items and sample subjects.

A brief summary observations and conclusions regarding the EGCS discharge Sheens is made by ADEC CPVEC and is included at the end of this document.

Table A
2018 EGCS Sheen Discharges
Compliance Reports OR

2018 General Information	Totals	Miscellaneous
► Total 2018 Registered Vessels	32	
► 2018 Vessels MGO operations SOx Control	10	Note: Millennium MGO - EGCS system under construction (8 10 18)
► Total 2018 Vessels with EGCS systems SOx Control	22	EGCS Systems SOx controls operated in AK
2018 Vessels with EGCS systems operated on OPEN LOOP SOx control process	15	EGCS type Open Loop (OL) uses Seawater (SW) for SOx removal CCL / HAL / PCL
2018 Vessels with EGCS systems operated in CLOSED LOOP SOx control process	7	EGCS type Closed Loop (CL) uses reagent for SOx removal bleeder discharge option NCL / RCL / CEL
2018 EGCS Discharge Compliance	Totals	Miscellaneous
► Total 2018 Vessels with EGCS (oil) sheens formations discharge <u>OR Reported</u> *	43	*OR observation / Reported
2018 Vessels with EGCS OPEN LOOP with (oil) sheens OR Reporting	43	
2018 Vessels with EGCS CLOSED LOOP with (oil) Sheens OR Reporting	0	2018 EGCS in Close Loop mode and open bleeder valve discharges no Sheen / discolorifications Observed /Reported by ORs
► Total 2018 Vessels with EGCS (oil) Sheens formations discharge <u>Vessel Self-Reported</u> ^	0	^ Self-Reporting to regulatory Agencies Including ADEC SPAR 5 EGCS discharge Event is Vessel Self Reporting unknown (ADEC CPVEC follow up)
2018 Vessels with EGCS OPEN LOOP with (oil) sheens Self Reporting	0	
2018 Vessels with EGCS CLOSED LOOP with (oil) Sheens Self Reporting	N/A	2018 EGCS in Close Loop mode and open bleeder valve discharges not Sheen / discolorifications observed (No Events)

Table B
2018 EGCS Sheen Discharges
OR Observations / ADEC CPVEC Follow Up
Summary

2018 EGCS Discharge Sheen Events											
OR EGCS Compliance Observation Results					ADEC CPVEC Follow Up						
Vessels with EGCS SOx Controls											
Date	CATS	Vessel	EGCS sheen	OR Report / Spill Report	Vessel Reporting	EGCS Discharge	EGCS Unit	HFO	Conditions Actions / Vendors / Root cause	Misc.	Misc. ADEC Internal
8 12 18	2018-R0972	Carnival Legend	Y / KTN	Y / N	No	Bubble 'Sheen'	OL Process DG 4-6 upon arrival DG 4 unk% (docked) DG4 Load @ unk	Yes 1.8 %S	EGCS continued operations / no process fine tunes	Vessel used for the first time when docked the EGCS system. EGCS has no gas traps installed at his time. Filtration system is not monitored over time; Δ P over filter is used as indicator to change. CCL feedback included No 'bubble-sheen' only bubbles! EGCS Bag Filter is 25 micron (mu)	
	1	2018 Carnival Legend Event									
2018	-	Infinity	No Sheen	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Infinity DG 1 + EGCS C/L
2018	-	Millennium	No Sheen	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2018	-	Solstice	No Sheen	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
6 8 18	2018-R0923	Amsterdam	Y / KTN	Y Y	Unknown	Grayish Sheen STB	OL Process DG 5 unk	Yes	EGCS stopped	N/A	

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7 9 18	2018-R0930	Eurodam	Y / JNU	Y Y	No	Blackish Substance / Soot Sheen -No sample kits on board (yet) No samples taken from soot parts / sheen	OL Process DG 1 75% DG 6 75% DG 5 Load @ 12:20 PM AKDT	Yes 1.4 %S	EGCS + DG 1 + 6 stopped / DG 5 on MGO operated	Vessel mentioned that the "soot" sheen was conform their "surface effects" files (vessel guidance). Filtration system operable and used?		
8 2 18	2018-R0931	Eurodam	Y / KTN	Y Y	No	Grayish Sheen /Soot Spot -Vessel mentioned sheen as per vessel "Surface Effects" guidelines. Sheen does not contain oil/ no samples taken (?).	OL Process DG 1 25% DG 6 55% DG 1 Load @ 06:00 AM AKDT	Yes 1.7 %S	EGCS continued operations / No Upsets / EGCS system operated as designed. Vendor not contacted	OR observed sheen during period extended time while in the Port of KTN.		
	2	2018 Eurodam Events										
5 14 18	N/A	Nieuw Amsterdam	Y / SEA	Y N								
5 28 18	2018-R0938	Nieuw Amsterdam	Y / JNU	Y Y	Unknown	Gray / Silver Sheen	OL Process DG 2 unk% DG 6 unk% DG Load @ 12:26 PM AKDT	Yes 1.7 %S	EGCS continued operations	Sheen observation after vessel was securely moored at dock. EGCS discharge in 'open water' (dolphin side) CT dock JNU. At 12:56 PM AKDT EGCS discharge sheen visible. EGCS sheen when DG 2 + DG 6 operated also sheen visible (slow vessel movement)		
5 31 18	2018-R0939	Nieuw Amsterdam	Y / KTN	Y Y	Unknown	Yellowish Foam Sheen	OL Process DG 2 unk% DG 2 load @ 05:30 PM AKDT	Yes 1.7 %S	EGCS continued operations	OR as standard measure / routine informed EO. This time 2 EO's on board; both witnessed the EGCS yellowish foam sheen. EO took photos of this sheen. It appears that DG 2 + EGCS was just brought on line?		
7 30 18	2018-R0940	Nieuw Amsterdam	Y / JNU	Y Y	No	Silver / Gray Sheen -Vessel did not report the sheen because when the agitation stopped sheen disappeared. Sample kits on board, because MGO switch no sample opportunity.	OL Process DG 1 40% DG 6 40% DG 6 Load @ 12:56 PM AKDT	Yes	EGCS stopped when docked switch MGO / EGCS systems no upsets / repairs etc.	PCL included in the response copies of the "Surface effects" manual to evaluate the EGCS sheen appearances. Vessel was in the maneuvering mode / Process of docking.		
	3	2018 Nieuw Amsterdam Events										
5 14 18	2018-R0591	Noordam	Y / JNU	Y Y	No	Light Bubbly Sheen [STB]	OL Process DG 4 55% DG 4 load @ 04:25 PM AKDT	Yes 1.8 %S	EGCS Continued operations / No system upset In Port mode with filtration system.	Vessel re-emphasizes that it does not report any sheen / foam discharge. "Surface Effects" Guidance. EGCS dilution flow sometimes reduced to meet pH VGP limit (e.g 6); lower flows less agitation prevent foam development / film forming.		

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5 31 18	2018-R0941	Noordam	Y / JNU	Y Y	Unknown	Sheen Bubbles	OL Process DG unk unk% DG Load @ 06:47 AM AKDT	Yes Unk %S	EGCS stopped / EGCS shut down produces more "bubbles / sheen".	OR informed EO about the "slight sheens" and observations in general.		
8 5 18	2018-R0942	Noordam	Y / SWD	Y Y	No	Sheen STB	OL Process DG 4 49% DG 4 load @ 08:40 AM AKDT	Yes	EGCS stopped/ switched over to MGO. Gas trap system OK	OR informed EO about observations. EGCS operations stopped / MGO switch. Vessel did not report: "Surface Effects" guidance. Possible cause "bottom stir"(sediments) Sample kits were on board. But the priority first to switch over / taken DG 4 off line took priority. After shut down water around EGCS Port milky substance.		
	3	2018 Noordam Events										
5 18 18	2018-R0949	Volendam	Y / JNU	Y Y	No	Foamy White Sheen	OL Process DG 2 34% DG 2 Load @ 12:50 PM AKDT	Yes	Unk	OR informed EO about observations. Vessel made reporting. On 15:00 PM AKDT EGCS discharge sampling performed.		
5 21 18	2018-R0950	Volendam	Y / KTN	Y Y	No	Foamy White Sheen	OL Process DG 2 27% DG 2 Load @ 09:45 AM AKDT	Yes	EGCS continued operations / No fine tunes made.	Vessel Turbidity is monitored. Vessel mentioned that OR provided photos of the 5 18 18 + 5 21 18 EGCS dis observations		
6 9 18	2018-R0951	Volendam	Y / SKG	Y Y	No	Silver / Gray Sheen	OL Process DG unk% DG Load @ 09:35 PM AKDT	Yes	EGCS continued operations	OR informed EO about observations.		
7 20 18	2018-R0952	Volendam	Y / TA area	Y Y	No	Sheen Stern -Vessel could not sample the sheen;- the vessel received July 13, 2018 the kits.	OL Process DG 3 77% DG 5 80% DG 3+5 Load @ 10:35 AM AKDT	Yes 1.8 %S	EGCS continued operations / No fine tunes made	Vessel stationary to offload pax for TA tour. OR informed EO about observations. OR video made		
7 23 18	2018-R0953	Volendam	Y / KTN	Y Y	No	Sheen STB -No samples taken because the sheen does not originate from vessel.	OL Process DG 5 53% DG 5 Load @ 11:36 AM AKDT	Yes 1.8 %S	EGCS continued operations / No Upsets / Confirmation same day all EGCS parameters are in line.	HAL notification: HAL believes this sheen is a pre- existing condition. Vessel will not report a spill because there is no-spill from the vessel. Filter modifications (valve logic) do not affect EGCS dis performance. Filter maintenance intervals not applicable; filters are self-cleaning.		
	5	2018 Volendam Events										
5 20 18	2018-R0948	Westerdam	Y / SWD	Y / Y	No	Sheen Aft STB	OL Process DG 2 unk%	Yes	EGCS continued operations	Note: Also that day oil leak hydraulic tender platform nonrelation to the observed EGCS sheens.		

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							DG 2 Load @ 09:43 AM AKDT					
6 3 18	2018-R0947	Westerdam	Y / SWD	Y / Y	No	Brown Foam Sheen	OL Process DG 2 unk% DG Load @ 08:00 AM AKDT	Yes	EGCS continued operations	OR informed the vessel about the observations DG 2 + DG 4 In Port Filter system		
7 1 18	2018-R0946	Westerdam	Y / SWD	Y / Y	No	Mystery Sheen around EGCS dis -Sheen samples has been taken on the Island PCL; vessel include the results.	OL Process DG 4 52% DG 4 Load @ 07:30 AM AKDT	Yes 1.2 %S	EGCS continued operations / No upsets / No fine tunes made.	OR informed the vessel about observations. SWD docking location small Bay it is believed that surface effects is caused by agitation of waterbody silt / sediment. Information AW filter system (In Port). Vessel provided general responses on the filtration system. This included photos.		
8 16 18	2018-R0968	Westerdam	Y / JNU	Y / Y	No	Sheen [STB] -No sample taken	OL Process DG 2 71% DG 2 Load @ 08:47 AM AKDT	Yes 1.8 %S	EGCS continued operations / All EGCS system operational /In Port Filtration in use	OR informed the vessel about observations. Because OR reported sheen condition to vessel, vessel had to make an observation verification. Vessel believes is not oil sheen merely 'surface effects'		
8 17 18	2018-R0979	Westerdam	Y / KTN	Y / Y	No	Foam Sheen [STB]	OL Process DG2 DG2 Load @ unk AKDT	Yes 1.8 %S	EGCS continued operations / All EGCS systems operational / In Port Filtration in use	Vessel believes there is no sheen to report. Sheen consisted of "surface debris" of the surrounding water that was accumulating at point of EGCS discharge. No EGCS fine tunes made.		
	5	2018 Westerdam Events										
5 11 18	2018-R0591	Zaandam	Y / JNU	Y / Y	No	Silver Sheen -No sample taken	OL Process DG 2 43% DG 2 Load @ 01:57 PM AKDT		EGCS continued / No upsets. Fine tunes were made later in AM same day.	Vessel process description: Feed pump → Supplies Washwater to Wash tower → This wash water Alfa Filter (back wash filter) when In port. The back wash from this filter goes through Bag filter system before into the mixer (dilution) → OB		
5 25 18	2018-R095	Zaandam	Y / JNU	Y / Y	No	EGCS Sheen -No sample taken	OL Process DG 2 unk% DG 2 Load @ 07:43 AM AKDT	Yes 1.7 %S	EGCS Continued operations	OR informed vessel about observations		
5 29 18	2018-R0956	Zaandam	Y / HMR	Y / Y	No	EGCS dis Sheen -No sample taken	OL process DG unk% DG Load @ 09:50 AM AKDT	Yes	EGCS continued operations	OR informed the vessel about observations. Vessel would not report this sheen asper CCL direction / guidances		

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6 9 18	2018-R0957	Zaandam	Y / HNH	Y / Y	No	EGCS dis Sheen -No Sample taken	OL Process DG unk% DG Load @ 12:35 PM AKDT	Yes	EGCS continued operations	OR informed the vessel about observations.		
6 22 18	2018-R0958	Zaandam	Y / JNU	Y / N	No	EGCS Dis Sheen -No sample taken / Sample was cancelled	OL Process DG 2 53% DG 2 Load @ 08:30 AM AKDT	Yes 1.8 %S	EGCS continued operation / No fine tunes /modifications made	EGCS filtration systems operated. PCL / HAL only report EGCS discharge anomalies if rainbow sheens are observed		
7 7 18	2018-R0959	Zaandam	Y / HNH	Y / Y	No	Discolorifications Water Sheen [STB] -No sample taken (see also Misc.)	OL Process DG 2 50% DG 2 Load @ 10:35 AM AKDT	Yes 1.8 %S	EGCS Continued operation / No upsets (problems)	Vessel believes that no reporting is needed for the EGCS discharges / sheens discolorifications. EGCS filtration system operated. Filters were changed June 24 18. No sample taken from sheen (kit). June 22 18 event not done. The planned sample project was initially for pH research project.		
	6	2018 Zaandam Events										
7 16 18	2018-R0960	Coral PCL	Y / KTN	Y / Y	No	EGCS Sheen -No Sample taken everything was clear on the water surface (See Misc.)	OL Process DG 2 30% DG 2 Load @ 09:38 AM AK DT	Yes 1.8 %S	EGCS Continued Operations / No process upsets	EGCS sheen not reported /discolorifications only EGCS systems are always used except in GB area. No schedule of EGCS operations. Vessel has sample kits on board.		
	1	2018 Coral PCL Event										
2018	-	Emerald PCL	No Sheen	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
6 4 18	2018-R0962	Golden PCL	Y / KTN	Y / Y	No	Foam Discolorification EGCS [STB]	OL Process DG unk% DG 2 Load @ 01:46 PM AKDT	Yes 1.8 %S	EGCS continued operations / DG 2 + EGCS remained online for Hotel Load	OR brought observation under vessel attention.		
6 13 18	2018-R0961	Golden PCL	Y / JNU	Y / Y	No	Discolorifications [STB]	OL Process DG 2 unk% DG 2 Load @ 06:05 AM AKDT	Yes	EGCS continued operations	OR brought observation under vessel attention. Photos with narrative included.		
	2	2018 Golden PCL Events										
8 27 18	2018-R0995	Grand PCL	Y / KTN	Y / Y	No	Silver Gray Sheen -No sample taken	OL Process DG 6 40% DG 6 Load @ 09:30 AM AKDT	Yes 1.9 %S	EGCS stopped after reporting sheen	EGCS + HFO DG 6 with filter system operated. DG4 was operated at the time on MGO. Vessel had no bunker analysis received. Filter exchanges 8 25 18. Vessel has no EGCS discharge sheen samples. No fuel additives used. Vessel used fuel homogenization systems 5% setting (IPCO System)		

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	1	<i>2018 Grand PCL Event</i>									
5 23 18	2018-R0963	Island PCL	Y / WHT	Y / Y	No	Sooty EGCS Dis Sheen	OL Process DG 3 unk% DG 3 Load @ 09:30 AM AKDT	Yes	EGCS stopped / shut down Sooty sheen disappeared	EGCS + DG3 dedicated source for in port use. In port filter installed (Filtrex Duplex Filter + Dry Filters). 5 23 18 First time EGCS + DG3 was on line while at dock. Sheen observations made by EO + OR (common witness). Earlier EGCS sheens were not detected.	
6 16 18	2018-R0964	Island PCL	Y / JNU	Y / Y	No	Silver Gray Sheen	OL Process DG unk% DG unk Load @ 08:40 PM AKDT	Yes	Specific event conditions not Reported	EGCS sheen conditions prior leaving Port of JNU.	
	2	<i>2018 Island PCL Events</i>									
8 16 18	2018-R1000	Ruby PCL	Y / KTN	Y / N	No	Dis Sheen -no sample taken from sheen (tide)	OL Process DG2 80% DG 2 Load @ 06:25 AM AKDT	Yes 1.8 %S	EGCS continued operations /no upset conditions	EGCS discharge to the Seaside (open).EGCS filtration system was operated. PCL / Vessel was not aware that pictures were taken of the EGCS discharge.	
8 23 18	2018-R0975	Ruby PCL	Y / KTN	Y/Y	No	Dark Sheen STB -No sample taken from sheen -Sample taken filters?	OL Process DG 2 74% Load @ 06:30 AM AKDT	Yes 1.8 S%	EGCS was stopped after reporting dark sheen / no upset	EGCS system was in auto - control mode. No actions after EGCS sheen observation (process side) were taken. Vessel did not confirm if the “ dark Sheen” discolorifications affects were included in the onboard “surface affects library”	
	2	<i>2018 Ruby PCL Events</i>									
7 14 18	2018-R0965	Star PCL	Y / WHT	Y / Y	No	Grayish Dis Sheen -No sample taken	OL Process DG 5 75% DG 6 75% DG 5 + 6 Load @ 08:28 PM AKDT	Yes 1.71 %S	EGCS continued operations / no upset	Vessels agrees (concurs) with observation EGCS sheen not oil sheen. No further actions required. If oil sheen was observed vessel will switch to MGO.	
7 23 18	2018-R0966	Star PCL	Y / WHT	Y / N (GOR made)	No	EGCS dis Sheen -No sample taken (See Misc.)	OL Process DG 1 unk % DG 1 load @ Unk	Yes 1.71 %S (OR)	EGCS later on stopped after ADEC E-mail (MGO). DG 3 Switch made 08:30 (08:28 OR) AM AKDT.(DG 1 secured 08:39 AM AKDT OR)	Port of KTN Harbor Master brought EGCS sheen observation under the vessel attention. Vessel could not confirm if there was an EGCS sheen or for that matter “Surface Effect”. Crew did not notice this event. OR / EO investigated the item. Vessel reconfirmed no USCG reporting made. DG1 has no In Port filtration system. Other units not available. Vessel has no sample kits (yet) on board. Expected to receive 7 24 18. HAL Upper management got involved in this case → USCG KTN / PC Interest?	
8 29 18	2018-R1043	Star PCL	Y / JNU	Y / N (OR Daily Report)	No	EGCS dis Sheen -No sample taken	OL Process DG 1 45% DG 2 47%	Yes 2.01 %S	EGCS continued operations / no upset	Vessel reported only internally. Vessel identified sheen as “biological film”. HFO fuel homogenization 2% Technical water was used. No upsets. TC washing	

							05:30 PM AKDT			with hazelnut husks + Eco Washing. Soot blowing is not conducted. Vessel cleans stacks with “infra-phone” vibrates the soot / scales loose, and expelled with exhaust gas stream.		
	3	2018 Star PCL Events										
	43	Total 2018 EGCS Discharge Sheen Events										

Notes:

- USCG Only = OR Reporting documentation shared USCG only. No ADEC Follow Up With Vessel.
- FWD USCG | Complete = OR Reporting documentation shared with USCG. ADEC Follow Up with Vessel - Questions → Vessel Feedback / Responses received – If shared with EPA (Region X ANCH) EPA notation included
- FWD USCG | Complete | EPA = OR Reporting documentation shared with USCG + EPA (Region X ANCH). ADEC Follow Up with Vessel - Questions → Vessel Feedback / Responses received

OL = Open Loop SOx removal Process (Seawater based)
Vessel Reporting = Include Event Reporting /Notifications to ADEC SPAR / ADEC CPVEC. State reporting requirement and reporting the National Spill Clearing House mandatory (USCG)
Unk / Unc = Unknown / Unconfirmed
PC = Public Concern
DG = Diesel Engine / Diesel Electric Generator
ANCH = Anchorage | HNH = Hoonah | HMR = Homer | HUB = Hubbard Glacier | JNU = Juneau | KTN = Ketchikan | SKG = Skagway | SWD = Seward | TA = Tracy Arm | WHT = Whittier | SEA = Seattle (WA)
STB = Starboard Side
PS = Portside
FWD = Forward
AFT = Aft
► Alaska Day Light Time (AKDT) → Universal Time Coordinated (UTC) – 8 hours (UTC offset)

Table C
2018 Ports + Areas
EGCS Sheen / Discharge
Observations

AK Ports / Areas with EGCS Sheen Observations	2018 Frequency of EGCS Discharge Sheen Observations	EGCS Sheen Observation per EGCS Type EGCS Open Loop	EGCS Sheen Observation per EGCS Type EGCS Closed Loop*
Port of Juneau (JNU)	14	EGCS OL	N/A
Port of Ketchikan (KTN)	13	EGCS OL	N/A
Port of Sitka (STK)	4	EGCS OL	N/A
Port of Seward (SWD)	4	EGCS OL	N/A
Port of Whittier (WHT)	3	EGCS OL	N/A
Port of Hoonah (HNH)	2	EGCS OL	N/A
Port of Skagway (SKG)	1	EGCS OL	N/A
Port of Homer (HMR)	1	EGCS OL	N/A
AK Waters / Tracy Arm Area (TA)	1	EGCS OL	N/A
Total AK EGCS Discharge Sheen Events	43	→ All EGCS Discharge Events with Open Loop Technology	

Note: * EGCS Combined system include operation in Open Loop or Closed Loop. In Closed Loop often EGCS bleeder discharges occur.

Table D
2018 EGCS Typical
Technical Operational
OR Observations

EGCS Technical / Operational Information				
Date	Vessel	Subject	Status Source	Misc.
6/10/18	Carnival Legend	Vessel in “commissioning stage” of the EGCS systems. Not frequent used (yet) in AK waters?	Closed / OR Report	Other OR Reports “on off” operations in AK waters (U/W). See 8/5/18
8/5/18	Carnival Legend	EGCS Filter system Testing / Gas traps not correctly sized. EGCS use only U/W	Closed / OR Report	N/A
8/21/18	Carnival Legend	EGCS system not operated “open loop” in Port of SKG (low salinity water)	Closed / OR Report	N/A
8/31/18	Carnival Legend	AK HFO operations terminated. MGO Use only. CCL HQ Instructions?	Closed / OR Report	After ADEC CPVEC inquiries 8 12 18 EGCS Event Port of KTN?
6/8/18	Infinity	EGCS system used in AK waters / Compliance > 90 minutes switch to MGO?	Open / OR Report	[REDACTED]
6/19/18	Infinity	EGCS system cleaning Washwater heat exchangers	Closed / OR Report	See OR Reports 6/20/18 6/21/18 2 day work routine maintenance. EGCS system not used (MGO)
8/17/18	Infinity	EGCS system lay out (screen)	Closed / OR Report	N/A
6/2/18	Millennium	EGCS system in the commissioning stage	Closed / OR Report	N/A
7/1/18	Millennium	EGCS system is only used > 12 nm (outside AK)	Closed / OR Report	N/A
7/2/18	Millennium	EGCS system is only used > 12 nm (outside AK) Software Issues precluded use of EGCS systems in AK.	Closed / OR Report	N/A
5/17/18	Solstice	EGCS System CL operation AK	Closed / OR Report	N/A
7/16/18	Solstice	EGCS system Repairs	Closed / OR Report	N/A
7/13/18	Amsterdam	EGCS system SW filter Cleaning (Intake)	Open / OR Report	[REDACTED]
7/24/18	Amsterdam	EGCS System operational order issued	Closed / OR Report	See 7 25 18 Amsterdam EGCS Sheen Discharges (Table Item)
7/25/18	Amsterdam	EGCS System Dry Bag Filter Unit	Closed / OR Report	N/A
7/23/18	Eurodam	EGCS SW inlet Strainers Cleaning	Closed / OR Report	N/A
7/25/18	Eurodam	EGCS discharge Orientation / MGO Switch	Closed / OR Report	FWD USCG CCL recommendation not to use EGCS when dis port is at dockside / only “open discharges”, EGCS to MGO immediately when sheen formations are noticed
8/8/18	Eurodam	EGCS operations on MGO / Wash Water discharges In Port	Closed / OR Report	Vessel did not “systematically” respond to the questions. DG1 failed to start, DG 3 was started on MGO. The EGCS pumps running on DG 1 was an oversight. Normal Operations of starting /shutting down the EGCS + DG is done automatically. In this case the interruption of start sequence, the EGCS has to be stopped manually.
8/8/18	Eurodam	EGCS process screen / parameters display	Closed / OR Report	N/A
8/13/18	Eurodam	EGCS not operated In Port / MGO service In Port only	Closed / OR Report	Vessel instructions from HQ? Shared information EO / OR.
8/16/18	Eurodam	EGCS sample rack info	Closed / OR Report	N/A
8/20/18	Eurodam	EGCS Process (simple) diagram	Closed / OR Report	N/A
5/23/18	Nieuw Amsterdam	EGCS filter system bag filters handling	Closed / OR Report	Related to the EGCS In Port filtration System
5/24/18	Nieuw Amsterdam	EGCS system not operated when DG were on line (EGCS control Item)	Closed / OR Report	FWD USCG USCG follow Up. SECA / SOx Non Compliance Item
7/3/18	Nieuw Amsterdam	EGCS system Trip / No EGCS Sheen Observed	Closed / OR Report	FWD USCG ADEC / PCL Follow Up questions

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8/22/18	Nieuw Amsterdam	ECO stream Soot Blower / Cleaning System	Closed / OR Report	N/A
8/23/18	Nieuw Amsterdam	EGCS SO2/ CO2 ratio sensor failure	Open / OR Report	
5/8/18	Noordam	EGCS operations stopped in Port of JNU to avoid elevated opacity levels (plume)	Closed / OR Report	N/A
5/30/18	Noordam	EGCS regulatory instrumentation / monitor record / SOx stack performance defective / Repairs made.	Closed / OR Report	FWD USCG Vessel replaced SO2 / CO2 sensors.
7/4/18	Noordam	EGCS on DG 1 DG 2 DG 4 / EGCS DG 2 + DG 4 have only In Port Filters System	Open / OR Report	
5/11/18	Volendam	EGCS operations stopped in Port. EGCS In Port filters are not operable and waiting for exchange filters	Open / OR Report	FWD USCG EGCS In Port filtration system does not work. MGO service in port. Vessel waiting for new filters. ► Underway EGCS discharge performance?
5/14/18	Volendam	EGCS difficulties to meet pH levels. Operational change pH not met, on EGCS switched off → MGO. More dilution water available for the remainder EGCS Units. Than the pH values are met.	Open / OR Report	
6/9/18	Volendam	EGCS FO usage / Filter arrangements and EGCS dis appearance	Closed / OR Report	EGCS filtration unit's /DG fuel arrangement setouts. DG 5 + EGCS broken In Port filtration System. DG 2 + EGCS functional In Port Filtration System. DG 3 + EGCS no In Port Filtration
7/7/18	Volendam	EGCS WQ parameters Sample Racks display (screen)	Closed / OR Report	N/A
7/15/18	Volendam	EGCS placard Instructions	Closed / OR Report	Engine Control Room pH limits posted ECA vs VGP (VGP waters)
8/3/18	Volendam	EGCS SW Inlet Filter Maintenance Cleaning	Closed / OR Report	N/A
8/31/18	Volendam	EGCS SW Inlet Filter Maintenance Cleaning	Closed / OR Report	N/A
5/1/18	Westerdam	EGCS in port filter Identification / use	Closed / OR Report	DG2 with "In Port Filters"
6/12/18	Westerdam	EGCS filter unit location / operational status	Closed / OR Report	N/A
7/4/18	Westerdam	EGCS SW inlet Filter Maintenance / Filter arrangements / EGCS Gas analyzer	Closed / OR Report	EGCS SW inlet strainers 3 Washwater pumps weekly cleaning. DG 5 EGCS separate SW inlet less cleaning. SW filter cleaning pending on operations/ hrs.
8/22/18	Westerdam	EGCS system lay out (screen)	Closed / OR Report	N/A
5/27/18	Zaandam	EGCS Operations technical restriction Port of Anchorage (ANCH area)	Closed / OR Report	EGCS SW intake muddy silt issues for EGCS intake.
6/26/18	Zaandam	EGCS Operational change Port of Homer (HMR)	Closed / OR Report	EGCS operations stopped to MGO / high silt in SW intake EGCS
6/29/18	Zaandam	EGCS SW filter info / Sample racks info	Closed / OR Report	EGCS SW high flow / velocity filters SW system replaced modified.
7/10/18	Zaandam	EGCS operational limitations Cook Inlet (HMR)	Closed / OR Report	EGCS SW intake silty issues EGCS intake
8/22/18	Zaandam	EGCS operations driven by EGCS discharge position (dock-side)	Closed / OR Report	N/A
5/13/18	Coral PCL	EGCS EPA regulatory 2018 AK seasonal operations / Instructions	Closed / OR Report	Includes: For AK waters "2018 Interim Effluent Limit" (for underway /in port / maneuvering). <ul style="list-style-type: none">EGCS pH limits: vessel will comply 6.0 pH limit, but in any event not lower than 5.7 pH, except for10% of each day the pH may be as low 5.5 pH"EGCS Limits: IMO /EPA VGP same (Tur / PAH / SO2/ CO2) → except for pH IMO pH: 4.0 EPA pH: 6.0 – '2018 EPA AK Interim' pH 5.7

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				<ul style="list-style-type: none"> Bunker Contracts SEA / VAN HFO below 2% Sulfur with meeting US VGP Washwater pH requirements.
7/8/18	Coral PCL	EGCS DG1 In Port operations HQ allowed without In Port filtration unit	Closed / OR Report	ADEC / PCL Follow Up. Only that the test was not failed. Which was correct. ► PCL did not responded to all mini questions (open Items).
7/8/18	Coral PCL	EGCS testing Port of SKG	Closed / OR Report	FWD USCG Correction EGCS passed the test.
7/16/18	Coral PCL	EGCS recording FO NAPA system	Open / OR Report	
7/25/18	Coral PCL	EGCS SW filters DG 1 + DG 2 cleaning WHT	Closed / OR Report	N/A
7/28/18	Coral PCL	EGCS dis pH performance Port of SKG	Closed / OR Report	FWD USCG Completed PCL / ADEC Telephone Notes
7/22/18	Coral PCL	EGCS filtrex filters strainers cleaning	Closed / OR Report	N/A
7/27/18	Coral PCL	EGCS filtrex filters cleaning DG3	Open / OR Report	
8/3/18	Coral PCL	EGCS process Sample Rack	Closed / OR Report	N/A
8/11/18	Coral PCL	EGCS pH testing handheld instrument water body SKG by vessel EO	Open / OR Report	
8/28/18	Emerald PCL	EGCS cleaning off-load	Closed / OR Report	EGCS cleaning of-loads 0.01m3 Victoria BC
9/6/18	Emerald PCL	EGCS system lay out (screen)	Closed / OR report	N/A
5/21/18	Golden PCL	EGCS Operations start first in AK season (2018)	Closed / OR Report	FWD USCG Completed
5/31/18	Golden PCL	EGCS sampling / EGCS No. 2	Closed / OR Report	FWD USCG Flag State at least one per year sampling / US EPA VGP waters 2 samples per year. EGCS 2 was never used just new and started up this time in AK trade.
7 11 18	Golden PCL	EGCS SW inlet filter maintenance	Closed / OR Report	N/A
7 /21/18	Golden PCL	EGCS Filtration Filter system inlet valves wrong installed	Closed / OR Report	FWD USCG EGCS inlets valves logic installed wrongly not working. Resulted in system pumps damages. Vessel is working to fix he issue. More vessels?
7/26/18	Golden PCL	EGCS In Port Filter System Information Valve Arrangement / Valves repaired	Closed / OR Report	FWD USCG Details about the filtration unit valve arrangement (see 7 21 18).
8/5/18	Golden PCL	EGCS system Lay Out (screen)	Closed / OR Report	N/A
8/20/18	Golden PCL	EGCS system Filters / Spent filter handling	Closed / OR Report	N/A
8/23/18	Golden PCL	EGCS system test run planning	Open / OR Report	
5/4/18	Island PCL	EGCS Operational Approval Regime	Closed / OR Report	FWD USCG Details not operated EGCS DG 1 + DG2 + DG 3 pending USCG approval.
5/18/19	Island PCL	EGCS OR vessel C/E discussion communication about EGCS sheen Reporting	Closed /OR Report	N/A
5/19/18	Island PCL	EGCS test Run At night	Closed / OR Report	FWD USCG Completed EGCS filtrex filters just installed and time necessitated to test at night.
7/4/18	Island PCL	EGCS Test runs WHT	Closed /OR Report	N/A
5/28/18	Island PCL	EGCS DG 3 screen schematic (system / process) information	Closed / OR Report	N/A
6/8/18	Island PCL	EGCS SW Inlet Chests / cross-over set out information	Closed / OR Report	N/A
6/25/18	Ruby PCL	EGCS performance testing JNU (dilution / no-dilution etc.)	Open / OR Report	
6/26/18	Ruby PCL	EGCS SW back wash filters	Closed / OR Report	N/A
7/3/18	Ruby PCL	EGCS + DG 2 tests in port filtration system SKG	Closed / OR Report	New 100 micron filter in 'In Port' filtration unit.
7/12/18	Ruby PCL	EGCS system Sea inlet strainers cleaning	Closed / OR Report	N/A
7/26/18	Ruby PCL	EGCS system Sea inlet strainers cleaning	Closed / OR Report	N/A
7/31/18	Ruby PCL	EGCS spent (Wet) Filters in drums for off load	Closed / OR Report	Wet EGCS filters in drums for off-loading Victoria BC. ADEC CPVEC check with off load filing /plans.
8/7/18	Ruby PCL	EGCS Bag Filter and Monitoring System	Closed / OR Report	N/A
8/2/18	Ruby PCL	EGCS Sea Strainer Cleaning	Closed / OR Report	N/A

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5/22/18	Star PCL	EGCS operations SKG discussion	Open / OR Report	
8/26/18	Star PCL	EGCS In Port Filtration system 50 micron (µm) filter information	Closed / OR Report	Examples of clean and spent filter. The 50 microns filter slows the formation of bubbles.
6/4/18	NCL Bliss	EGCS system description	Closed / OR Report	EGCS Closed loop operations / filtration
6/19/18	NCL Bliss	EGCS system Inlet SW / Strainers	Closed / OR Report	N/A
7/17/18	NCL Bliss	EGCS system description	Closed / OR Report	EGCS Closed Loop focus on solids separation
7/19/18	NCL Bliss	EGCS manual / system descriptions	Closed / OR Report	N/A
8/21/18	NCL Bliss	EGCS operations Endicott Arm	Closed / OR Report	EGCS operated in CL / Bleeder valve closed
8/21/18	NCL Bliss	EGCS operations waste off loads	Closed / OR Report	EGCS waste generated 2 m3 per AK trip / Offload Vic BC.
7/1/18	NCL Jewel	EGCS system lay out (screen)	Closed / OR Report	N/A
7/11/18	NCL Jewel	EGCS Sludge collection drum	Closed / OR Report	EGCS sludge collected and stored in 55 gallons drums for offload > AK
8/12/18	NCL Jewel	EGCS System Lay out (screen / CL)	Closed / OR Report	N/A
8/18/18	NCL Jewel	EGCS Systems Lay out (screen)	Closed / OR Report	N/A
5/2/18	NCL Pearl	EGCS operations Closed Loop / Bleeder Valve Open	Closed / OR Report	EGCS bleeder discharges not visible / sheens etc.
6/22/18	NCL Pearl	EGCS system lay out	Closed / OR Report	N/A
6/27/18	NCL Pearl	EGCS system filter system lay out	Closed / OR Report	N/A
8/17/18	NCL Pearl	EGCS system DG 3 Lay out (screen)	Closed / OR Report	N/A
8/22/18	NCL Pearl	EGCS screen-press screenings	Closed / OR Report	N/A
6/5/18	Infinity	EGCS operations discussion closed loop	Closed / OR Report	N/A
6/19/18	Infinity	EGCS Washwater heat exchanger cleaning	Closed / OR Report	EGCS system shut down. Earlier about 4.5 m3 EGCS waste from tank sent ashore > AK. EGCS system on line on 6 21 18.
7/24/18	Infinity	EGCS system lay out (screen)	Closed / OR Report	N/A
6/2/18	Millennium	EGCS not Commissioned	Closed / OR Report	N/A
7/3/18	Millennium	EGCS only operated > 12 nm (out > AK)	Closed / OR Report	Software update for EGCS switch open → closed loop mode.
8/11/18	Millennium	EGCS system software Issue	Closed / OR Report	Software Issue EGCS system / EGCS not used /operated (AK).
9/2/18	Millennium	EGCS not in commission	Closed / OR Report	Vessel operated on MGO
5/17/18	Solstice	EGCS SOx / CO2 + Dis monitoring data	Closed / OP Report	Copy of regulatory EGCS parameters monitoring
7/16/18	Solstice	EGCS repairs / maintenance	Closed / OR Report	N/A
8/1/18	Solstice	EGCS System Lay out (screen)	Closed / OR report	N/A
9/2/18	Solstice	EGCS system lay out / utilization	Closed / OR Report	EGCS systems on DG 1 + DG 2 + DG 4 CL in AK waters OL > AK (4 nm)
5/23/18	Radiance of the Seas	EGCS Operations in AK not performed	Closed / OR Report	FWD USCG EGCS cooling system issues. HQ order not to operate.
6/25/18	Radiance of the Seas	EGCS Operations not in Closed loop possible	Closed / OR Report	Not operated in closed loop till gas instrumentation is arrived.
7/1/18	Radiance of the Seas	EGCS cleaning operations Soot removal	Closed / OR Report	Soot collection drums for offload > AK
8/20/18	Radiance of the Seas	EGCS Opacity (plume) performance process factors	Open / OR Report	
6/24/18	Explorer of the Seas	EGCS tank arrangement expansion BW Tk 4 conversion EGCS alkaline tank	Closed / OR Report	EGCS new system tankage conversion

TABLE E
EGCS Discharge
Sample | Performance Data

EGCS Sample / Performance data				
Date	Vessel	Subject	Status Source	Misc.
6 25 18	Island PCL	Island PCL EGCS Sample Analysis / AE 20172	Open PCL	
6 29 18	Amsterdam	EGCS LRS + Vessel Engineer morning sampling pH / Outflow Port of KTN	Open OR Report	
8 23 18	Eurodam	EGCS DG 1 sample event Port of KTN	Open OR Report	
8 27 18	Eurodam	EGCS In house Sample Information 827 18 Port of JNU	Open OR Report	
5 29 18	Nieuw Amsterdam	EGCS Sample Event Planned SKG	Open OR Report	
8 23 18	Nieuw Amsterdam	EGCS sampling consultant on board for Washwater sampling design Port of KTN	Open OR Report	
5 23 18	Noordam	Noordam EGCS Outflow sampling JNU DG 4 + EGCS	Open OR Report	
6 14 18	Noordam	EGCS sample Kits received on board	Closed OR Report	N/A
6 21 18	Westerdam	EGCS Sample Event SKG	Open OR Report	
6 23 18	Coral PCL	EGCS sample Event JNU cancelled	Open OR Report	
7/24/18	Golden PCL	EGCS Filtration System Testing SKG	Closed OR Report	EGCS No. 2 in port filtration system tested by Engineer + CCL Engineers. Port of SKG. No sheens detected.
8/21/18	Golden PCL	EGCS QA QC Plan Questions Regulatory instrumentation	Open OR Report	
8/21/18	Golden PCL	EGCS "Final Lab Report" Golden PCL 17-Aug-2018 / 31801077	Open OR Report	
8/23/18	Golden PCL	EGCS testing in Port KTN	Open OR Report	
7/4/18	Island PCL	EGCS sharing sample data with OR. Island PCL?	Open OR Report	
6/25/18	Ruby PCL	EGCS sampling pH JNU	Open OR Report	
6/28/18	Ruby PCL	EGCS sampling pH KTN	Open OR Report	
5/23/18	Star PCL	EGCS Sampling pH JNU	Open OR Report	
6/25/18	Star PCL	EGCS Sampling pH JNU	Open OR Report	
8/29/18	Star PCL	EGCS sample kits	Closed OR Report	Discussion about the sample kits and planning of sample event (utilization)
8/30/18	Star PCL	EGCS sample results 4 25 18 / 11 28 17 oil review	Open OR Report	
8/30/18	Star PCL	EGCS discharge PAH exceedance	Closed OR Report	EGCS discharge include PAH > 53 ppb? Was within 6 hours fixed? Vessel follow up report there were no PAH alarms on 930 18.DG 1, 2, 5 and 6 were used. When docked DG2 with EGCS + In port filter.
6/6/18	NCL Jewel	EGCS sampling pH JNU	Open OR Report	

- 2018 was the second year of full operations of EGCS systems although some vessel's EGCS systems are still in the final commissioning stage.
- Some EGCS System modifications were made, although it appears that structural EGCS system changes compared to 2017 status are not made or completed. This in particular the case with the EGCS filtrations systems.
- Some EGCS Systems received in 2018 software updates for the regulatory monitoring system / process controls.
- EGCS discharge performance is not in full compliance regarding the:
 - pH values EGCS discharges (spikes)
 - EGCS discharge sheens were regularly observed, especially when vessel is docked / stationary.
 - Opacity performance of the Combustion Sources (Diesel Electric Generators / DG's) operated in combination with EGCS systems showed in general elevated opacity levels. Note: Stacks plume review according the EPA RM 9, and excluding steam plume!
- EGCS operations with 'poor' noncompliance performance regarding the EGCS WQ parameters were often continued for a prolonged time. Vessels claimed this was allowed under the US EPA agreement.
- OR Observed and reported discharge Sheens from the EGCS outlet were in most of the case not reported by the vessel. The vessel believes that these EGCS discharge sheens are surface effects and so not contain oil or VOC's.
- OR management reported that vessel "discouraged" OR to report the EGCS discharge appearances (sheens)
- OR reported that EGCS access / EGCS projects went well, and the vessels were cooperative.

EGCS Discharge Performance WQ related:

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- EGCS system are not operated in the Glacier Bay National Park. This is a requirement from the National Park Service. All vessels using MGO within the park boundaries.
- EGCS systems are not operated on a voluntary basis in Tracy Arm / Endicott Wilderness Area. OR could not verify this except for the “fuel switch over” made before entering the area.
- EGCS systems are often not operated on a voluntary basis in the Hubbard Glacier and College Fjord Area. OR could not verify this, except for the “fuel switch over” made before entering the area.
- EGCS system overboard water intake in water bodies with relatively high silt content, the EGCS systems are not operated. This was in 2018 reported on certain vessels operated in Cook Inlet area (Port of Anchorage).
- EGCS overboard (intake) filter system requires regular cleaning.
- EGCS performance questions /compliance verifications. Vessel responses included often that EGCS system manufacturer/representative was not consulted even with similar (repeat) EGCS compliance issues.
- Clear consistent EGCS operational (SOx compliance) strategies seems not in place. Vessels try to use the EGCS systems while underway and In Port. EGCS system operation and EGCS unit choice and the switch to MGO (low sulfur fuel) operations seems to be ‘randomly’ selected. Factors such as EGCS unit availability, EGCS environmental performance concerns (discharge sheens, opacity, maintenance, public complaints etc.) appears to drive in 2018 AK season the SOx control options (EGCS operations). It should be noted that it seems that the EGCS units are used underway during the Alaska Port to Port travel are utilized more frequently (e.g. at night)

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