

November 3, 2010

Recipient
Cruise Line
via e-mail

Re: Request on behalf of Alaska Cruise Ship Science Advisory Panel

Dear _____:

I am writing on behalf of the 2009 Alaska Cruise Ship Wastewater Science Advisory Panel. As you may know, the Panel is still working on understanding the specific operations and logistics of installation and operation of wastewater treatment systems on cruise ships.

Because each cruise line operates differently using different advanced wastewater treatment systems (AWTS), one of the challenges facing the Panel is understanding and comparing the current equipment used on vessels and the ability of those systems to treat 100% of the waste stream to meet the 2013 future effluent standards. Specifically, they are trying to compare specific information about the currently installed wastewater treatment systems:

The Panel drafted this letter during our October 21-22 third face-to-face meeting. For each ship, they would specifically like to know:

1. What were manufacturer's performance specifications for the AWTS?
2. How does the system perform compared to those specifications?
3. Was the system intended to treat 100% of wastewater in continuous operation?
4. Is wastewater segregated (laundry, galley, black) and are individual streams treated separately or not at all?
5. If 100% of waste stream is not treated, what percentage of gray vs. black water is treated?
6. What is the ratio of graywater to blackwater treated?
7. What was the cost of installing the equipment used now (installation, equipment, year installed)?
8. Were they new installations or retrofits?
9. What is the annual cost of operating and maintaining the current equipment (including modifications)?

Thank you for helping the Panel learn about specific operations and logistics of AWTS on cruise ships. This information will be critical to their work. I, the Science Advisory Panel, and the DEC appreciate your efforts to help the Panel. Please let me know if there is someone else I should contact, or if you have questions or concerns. My direct contact information is below.

Thank you in advance,



Krista Webb
Project Manager
OASIS Environmental, Inc.

k.webb@oasisenviro.com
206-842-5398 ext 23

January 7, 2011

Cruise Line Operators
Cruise Line
via e-mail

Re: Information Request on behalf of Alaska Department of Environmental Conservation Cruise Ship Science Advisory Panel

Dear Sir or Madam:

I am writing on behalf of the 2009 Alaska Cruise Ship Wastewater Science Advisory Panel to follow up on our letter of November 3, 2010. As you may know, the Panel is still working on understanding the specific operations and logistics of installation and operation of wastewater treatment systems on cruise ships.

The panel requests the information described below in order to compare existing technology to help determine the most technically efficient and economically feasible current technology. Because each cruise line operates differently using different advanced wastewater treatment systems (AWTS), one of the challenges facing the Panel is understanding and comparing the current equipment used on vessels and the ability of those systems to treat 100% of the waste stream to meet the 2013 future effluent standards. Specifically, they are trying to compare specific information about the currently installed wastewater treatment systems:

The Panel drafted this letter during our October 21-22 third face-to-face meeting. For each ship, they would specifically like to know:

1. What were manufacturer's performance specifications for the AWTS?
2. How does the system perform compared to those specifications?
3. Was the system intended to treat 100% of wastewater in continuous operation?
4. Is wastewater segregated (laundry, galley, black) and are individual streams treated separately or not at all?
5. If 100% of waste stream is not treated, what percentage of gray vs. black water is treated?
6. What is the ratio of graywater to blackwater treated?
7. What was the cost of installing the equipment currently onboard (installation, equipment, year installed)?
8. Were they new installations or retrofits?
9. What is the annual cost of operating and maintaining the current equipment (including modifications)?

The Panel was hoping to get this information reviewed and on the agenda for discussion at their next teleconference meeting at the beginning of February, thus, we respectfully request your reply by January 27, 2011.

Thank you for helping the Panel learn about specific operations and logistics of AWTS on cruise ships. This information will be critical to their work. I, the Science Advisory Panel, and the DEC appreciate your efforts to help the Panel. Please let me know if there is someone else I should contact, or if you have questions or concerns. My direct contact information is below.

Thank you in advance,



Krista Webb
Project Manager
OASIS Environmental, Inc.

k.webb@oasisenviro.com

206-842-5398 ext 23

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Zissis Koskinas, zkoskinas@celebritycruises.com

Responses to 11/3/10 and 1/7/11 letter to ACA members for information about individual systems.

	Prestige (Seven Seas Mariner and Navigator) (11/9/10)	Princess (1/27/11)	Holland America (1/27/11)	Disney (1/11/11)	Crystal Cruises (1/10/11)	Royal Caribbean (11/3/10)
What were manufacturer's performance specifications for the AWTS?	Both manufacturers guaranteed to meet the 2009 USCG & ADEC continual discharge requirements	Hamworthy Membrane Bio-Reactors (MBR's) were designed to meet the Murkowski requirements for Fecal Coliform, BOD, TSS limits.	See separate table	MEPC159(55) and 33 C.F.R.159 Subpart E Discharge of effluents in Certain Alaskan Waters by Cruise Vessel Operations; the system was designed to meet the MURKOWSKI standards. About 1 year after the installation was completed, we are now also able to meet requirements as, outlined in 33 C.F.R.159 .	No AWTS on board, did not respond to questions,	No Permit, did not respond to questions.
How does the system perform compared to those specifications?	The Hamworthy has consistently exceeded these standards. The Scanship did not meet the 2009 ADEC continuous discharge requirements.	Hamworthy Membrane Bio-Reactors (MBR's) normally meet these performance specifications.		Compliant		
Was the system intended to treat 100% of wastewater in continuous operation?	Yes - Neither system treats pulper water from the galleys. This is the only exception.	No		Yes		
Is wastewater segregated (laundry, galley, black) and are individual streams treated separately or not at all?	All gray water converges into a mixing tank before entering the processing plants. The black water enters the plant separately, but all wastestreams are mixed throughout the processing plant.	Hamworthy Membrane Bio-Reactors (MBR's) treats black and accommodations gray water. Laundry and Galley gray waters are segregated from the Hamworthy Membrane Bio-Reactors (MBR's).		Mixed		

Responses to 11/3/10 and 1/7/11 letter to ACA members for information about individual systems.

	Prestige (Seven Seas Mariner and Navigator) (11/9/10)	Princess (1/27/11)	Holland America (1/27/11)	Disney (1/11/11)	Crystal Cruises (1/10/11)	Royal Caribbean (11/3/10)
If 100% of waste stream is not treated, what percentage of gray vs. black water is treated?	NA	Hamworthy Membrane Bio-Reactors (MBR's) treat 100% black water and variable proportions of accommodations gray water based on operations. (Laundry and Galley gray waters are not treated).		N/A		
What is the ratio of graywater to blackwater treated?	Both ships process a ratio of 5:1 gray/black (estimation)	There is an approximately 3/1 ratio of graywater to blackwater which is treated by Hamworthy Membrane Bio-Reactors (MBR's).		Flow rate for individual waste streams were not measured. Estimated gray : black ratio = 6.6 : 1		
What was the cost of installing the equipment used now (installation, equipment, year installed)?	Seven Seas Navigator's Scanship AWTS cost approx. \$1.9 million to retrofit in November 2009. Seven Seas Mariner was fitted with the Hamworthy MBRs upon delivery in 2002, prior to PCH assuming management.	The cost depends on the size of the ship and # of MBR's required. The last ship we installed the MBR system was on the Royal in 2010 which is one of our smaller ships. The cost was \$1,961,750 for the material and labor and \$190,000 for the permeate UV system which totaled \$2,151,750. The Golden which is part of the Grand class was done in 2007 and the cost was approx. \$3.4M.		Approximately \$6.0m / ship to install Hamworthy system in 2009		
Were they new installations or retrofits?	Seven Seas Navigator's AWTS was a retrofit	All retrofits.		Retrofits		

Responses to 11/3/10 and 1/7/11 letter to ACA members for information about individual systems.

	Prestige (Seven Seas Mariner and Navigator) (11/9/10)	Princess (1/27/11)	Holland America (1/27/11)	Disney (1/11/11)	Crystal Cruises (1/10/11)	Royal Caribbean (11/3/10)
What is the annual cost of operating and maintaining the current equipment (including modifications)?	<p>The Scanship costs approx. 190k/annually. The Hamworthy costs aprox. 90k/annually.</p> <p>Scanship AWTS on our Seven Seas Navigator necessitated a dedicated Engine Officer because the plant is so sensitive and labor-intensive. The Officer's salary is \$53,760 annually.</p>	<p>The total annual cost of operating is approx \$160k for 11 ships. So it comes out to approx \$14,545/yr for each ship.</p>		<p>Approximately \$500k to run / year</p>		

Holland America Line Response to January 2011 Alaska Science Advisory Panel Advanced Waste Water Purification System Questionnaire

	<p>Zenon systems combine gray water and black water in the biodigestion stage. Microbial biodigestion occurs at this stage, with some incidental anaerobic denitrification occurring, although not an engineered aspect of the design. Ultra filtration membranes separate solids and bacteria from the 'permeate' prior to ultra-violet light disinfection prior to discharge. System strengths lie in its relative simplicity. Blending of gray/black water yields a lower ammonia concentration at the overboard.</p>					<p>Rochem systems treat gray water and black water separately. Daily load of 40-60 tons Black Water is mixed with about 20-30 tons of gray water to reach capacity of biodigestion system. This waste stream is subject to biodigestion and ultra filtration prior to UV disinfection. Because of the absence of organic material, separately treated gray water is not subject to microbial digestion and is filtered with reverse osmosis membranes. Service use has revealed ROCHEM UF membrane susceptibility to anionic clogging due to elements in common detergents or shampoos. This resulted in a significant reduction in treatment flux and ultimately premature membrane failure.</p> <p>OVIVO: Recent retrofits on Westerdam and Noordam installed OVIVO oxidation/UF/RO systems and are designed to provide membrane treatment of gray water. It is yet to be determined whether this technology will prove effective.</p>			
	"S" Class			"R" Class		Vista Class			
	Statendam	Ryndam	Veendam	Volendam	Zaandam	Zuiderdam	Oosterdam	Westerdam*	Noordam*
Treatment System	Zenon I	Zenon III	Zenon III	Zenon II	Zenon II	Rochem	Rochem	Rochem / OVIVO	Rochem / OVIVO
Treatment System Specifications	Comply with Murkowski (relevant standard at time of purchase)	Comply with Murkowski (relevant standard at time of purchase)	Comply with Murkowski (relevant standard at time of purchase)	Comply with Murkowski (relevant standard at time of purchase)	Comply with Murkowski (relevant standard at time of purchase)	Comply with Murkowski (relevant standard at time of purchase)	Comply with Murkowski (relevant standard at time of purchase)	Rochem: Comply with Murkowski OVIVO: spec'd to meet January 2010 Draft AK Cruise Ship Permit Limits (most relevant standard at time of contracting)	Rochem: Comply with Murkowski OVIVO: spec'd to meet January 2010 Draft AK Cruise Ship Permit Limits (most relevant standard at time of contracting)
Performance Comments	Zenon systems have performed well to the Murkowski standards, while requiring partial membrane replacement after years of service.					Black Water Treatment generally good to meet Murkowski. Gray water membranes failed after relatively short service; no longer treating gray water with this system. Consequently, Black water (with 20% gray water), shows elevated ammonia levels.	Black Water Treatment generally good to meet Murkowski. Gray water membranes failed after relatively short service; no longer treating gray water with this system. Consequently, Black water (with 20% gray water), shows elevated ammonia levels.	Black Water Treatment generally good to meet Murkowski. Gray water not treated w/ Rochem due to membrane failure. Recently retrofitted with new reverse osmosis membranes. Commissioning still in process and treatment efficiency not yet determined.	Black Water Treatment generally good to meet Murkowski. Gray water not treated w/ Rochem due to membrane failure. Recently retrofitted with new reverse osmosis membranes. Commissioning still in process and treatment efficiency not yet determined.
Percent of wastewater treated	90%	90%	90%	90%	90%	100% black, 20% gray water	100% black, 20% gray water	Rochem: 100% black, 20% gray water Retrofitted OVIVO system expected to treat 100% black, 60% gray Water	Rochem: 100% black, 20% gray water Retrofitted OVIVO system expected to treat 100% black, 60% gray Water
Is wastewater segregated?	gray water / black water mixed	gray water / black water mixed	gray water / black water mixed	gray water / black water mixed	gray water / black water mixed	gray water/ black water segregated	gray water/ black water segregated	gray water/ black water segregated	gray water/ black water segregated
Percent of Gray Water/Black Water treated	90% gray / 100% black water treated	90% gray / 100% black water treated	90% gray / 100% black water treated	90% gray / 100% black water treated	90% gray / 100% black water treated	100% black, 20% gray water	100% black, 20% gray water	100% black, 60% gray water projected for OVIVO system	100% black, 60% gray water projected for OVIVO system
Gray water / Black Water ratio in treated effluent	GW:BW = 10:1	GW:BW = 10:1	GW:BW = 10:1	GW:BW = 10:1	GW:BW = 10:1	BW:GW ratio ~ 2:1	BW:GW ratio ~ 2:1	BW:GW ratio yet to be determined w/ OVIVO system	BW:GW ratio yet to be determined w/ OVIVO system
Cost of Installation	\$2.15 Million	\$2.15 Million	\$2.15 Million	\$2.15 Million	\$2.15 Million	\$3 Million	\$3 Million	Rochem: \$3 Million OVIVO retrofit: proprietary	Rochem: \$3 Million OVIVO retrofit: proprietary
Year Installed	2001	2003	2003	2002	2002	2002	2003	2004/ Retrofit in Progress	2006/ Retrofit in progress
New or Retrofit	Retrofit	Retrofit	Retrofit	Retrofit	Retrofit	New Build	New Build	New Build / Retrofit in progress	New Build / Retrofit in progress
Annual Operating Costs (including maintenance & modifications, Dedicated Engineer, membrane amortization)	\$ 175,500	\$ 175,500	\$ 175,500	\$ 175,500	\$ 175,500	\$ 208,600	\$ 208,600	Rochem \$208,600 OVIVO: not yet determined	Rochem \$208,600 OVIVO: not yet determined

Krista Webb

From: Christina Riccelli [CRiccelli@prestigecruiseholdings.com]
Sent: Wednesday, November 10, 2010 11:46 AM
To: Krista Webb
Cc: robert.edwardson@alaska.gov
Subject: RE: letter from DEC Wastewater Science Advisory Panel

Dear Krista,

No problem – I'm happy to help.

The only other noteworthy information I forgot to include is that the Scanship AWTS on our Seven Seas Navigator necessitated a dedicated Engine Officer because the plant is so sensitive and labor-intensive. The Officer's salary is \$53,760 annually.

If you would like any further information – please just let me know.

Thanks,

Christina M. Riccelli
Director, Environment & Public Health
Prestige Cruise Holdings, Inc.
8300 NW 33rd Street | Suite 308 | Miami, FL 33122
Office +1 305 514 3957 | Mobile +1 954 240 2904
Oceania Cruises | Regent Seven Seas Cruises
CRiccelli@PrestigeCruiseHoldings.com

From: Krista Webb [<mailto:K.Webb@oasisenviro.com>]
Sent: Wednesday, November 10, 2010 1:10 PM
To: Christina Riccelli
Cc: robert.edwardson@alaska.gov
Subject: RE: letter from DEC Wastewater Science Advisory Panel

Thank you so much for your reply Christina. This information will be very helpful for the Panel.

Krista

From: Christina Riccelli [<mailto:CRiccelli@prestigecruiseholdings.com>]
Sent: Tuesday, November 09, 2010 11:43 AM
To: Krista Webb
Subject: RE: letter from DEC Wastewater Science Advisory Panel

Dear Krista,

Please see my responses on behalf of our 2 cruise ships, Seven Seas Mariner & Seven Seas Navigator, who sailed in Alaska waters during 2009 & 2010, respectively. PCH has been managing Regent Seven Seas Cruises since May 2009. For your information, our Oceania Cruises' ship, *Regatta*, will sail into Alaska in 2011 for the first time. She is currently being retrofitted with a Triton Water MBR (2).

The responses are based upon the *Seven Seas Navigator's* AWTS by Scanship & *Seven Seas Mariner's* AWTS, by Hamworthy:

1. What were manufacturer's performance specifications for the AWTS? **Both manufacturers guaranteed to meet the 2009 USCG & ADEC continual discharge requirements**
2. How does the system perform compared to those specifications? **The Hamworthy has consistently exceeded these standards. The Scanship did not meet the 2009 ADEC continuous discharge requirements.**

3. Was the system intended to treat 100% of wastewater in continuous operation? **Yes - Neither system treats pulper water from the galleys. This is the only exception.**
4. Is wastewater segregated (laundry, galley, black) and are individual streams treated separately or not at all? **All gray water converges into a mixing tank before entering the processing plants. The black water enters the plant separately, but all wastestreams are mixed throughout the processing plant.**
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6. What is the ratio of graywater to blackwater treated? **Both ships process a ratio of 5:1 gray/black (estimation)**
7. What was the cost of installing the equipment used now (installation, equipment, year installed)? **Seven Seas Navigator's Scanship AWTS cost approx. \$1.9 million to retrofit in November 2009. Seven Seas Mariner was fitted with the Hamworthy MBRs upon delivery in 2002, prior to PCH assuming management.**
8. Were they new installations or retrofits? **Seven Seas Navigator's AWTS was a retrofit**
9. What is the annual cost of operating and maintaining the current equipment (including modifications)? **The Scanship costs approx. 190k/annually. The Hamworthy costs aporox. 90k/annually.**

If you or anyone with Oasis Environmental has anymore questions, please don't ever hesitate to contact me.

I hope you find this information valuable.

Respectfully,

Christina M. Riccelli
Director, Environment & Public Health
Prestige Cruise Holdings, Inc.
8300 NW 33rd Street | Suite 308 | Miami, FL 33122
Office +1 305 514 3957 | Mobile +1 954 240 2904
[Oceania Cruises](#) | [Regent Seven Seas Cruises](#)
CRiccelli@PrestigeCruiseHoldings.com

From: Krista Webb [<mailto:K.Webb@oasisenviro.com>]
Sent: Wednesday, November 03, 2010 6:41 PM
To: Christina Riccelli
Subject: letter from DEC Wastewater Science Advisory Panel

Dear Ms. Riccelli,

Please find attached a request from the DEC Cruise Ship Wastewater Science Advisory Panel.

Please contact me if you have any trouble opening or viewing the file or questions about the letter. On behalf of the Panel, thank you in advance for your reply.

Best regards,
Krista

Krista L. Webb
Senior Scientist
OASIS Environmental, Inc.
360 Tormey Lane, Suite 298
Bainbridge Island, WA 98110

Phone: (206) 842-5398 ext. 23
FAX: (206) 780-5904
Cell: (360) 265-3984

Krista Webb

From: Christina Riccelli [CRiccelli@prestigecruiseholdings.com]
Sent: Tuesday, November 09, 2010 11:43 AM
To: Krista Webb
Subject: RE: letter from DEC Wastewater Science Advisory Panel

Dear Krista,

Please see my responses on behalf of our 2 cruise ships, Seven Seas Mariner & Seven Seas Navigator, who sailed in Alaska waters during 2009 & 2010, respectively. PCH has been managing Regent Seven Seas Cruises since May 2009. For your information, our Oceania Cruises' ship, *Regatta*, will sail into Alaska in 2011 for the first time. She is currently being retrofitted with a Triton Water MBR (2).

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6. What is the ratio of graywater to blackwater treated? **Both ships process a ratio of 5:1 gray/black (estimation)**
7. What was the cost of installing the equipment used now (installation, equipment, year installed)? **Seven Seas Navigator's Scanship AWTS cost approx. \$1.9 million to retrofit in November 2009. Seven Seas Mariner was fitted with the Hamworthy MBRs upon delivery in 2002, prior to PCH assuming management.**
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9. What is the annual cost of operating and maintaining the current equipment (including modifications)? **The Scanship costs approx. 190k/annually. The Hamworthy costs approx. 90k/annually.**

If you or anyone with Oasis Environmental has anymore questions, please don't ever hesitate to contact me.

I hope you find this information valuable.

Respectfully,

Christina M. Riccelli
Director, Environment & Public Health
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Office +1 305 514 3957 | Mobile +1 954 240 2904
Oceania Cruises | Regent Seven Seas Cruises
CRiccelli@PrestigeCruiseHoldings.com

From: Krista Webb [<mailto:K.Webb@oasisenviro.com>]
Sent: Wednesday, November 03, 2010 6:41 PM
To: Christina Riccelli
Subject: letter from DEC Wastewater Science Advisory Panel

Dear Ms. Riccelli,

Please find attached a request from the DEC Cruise Ship Wastewater Science Advisory Panel.

Please contact me if you have any trouble opening or viewing the file or questions about the letter. On behalf of the Panel, thank you in advance for your reply.

Best regards,
Krista

Krista L. Webb
Senior Scientist
OASIS Environmental, Inc.
360 Tormey Lane, Suite 298
Bainbridge Island, WA 98110

Phone: (206) 842-5398 ext. 23
FAX: (206) 780-5904
Cell: (360) 265-3984

Krista Webb

From: RPruitt@rccl.com
Sent: Wednesday, November 03, 2010 4:35 PM
To: Krista Webb
Subject: Re: letter from DEC Wastewater Science Advisory Panel

Ms Webb,

No Royal Caribbean Cruises Ltd ship (Royal Caribbean International and Celebrity Cruises) discharges in Alaska.

Regards,

Rich Pruitt
Associate Vice President, Environmental Programs
Royal Caribbean Cruises Ltd
1080 Caribbean Way
Miami, FL 33132-2096 USA
(305) 982-2179 (W) (305) 982-2104 (Fax)
(305) 495-2845 (Cellular)

From: Krista Webb <K.Webb@oasisenviro.com>
To: "rpruitt@rccl.com" <rpruitt@rccl.com>
Date: 11/03/2010 06:42 PM
Subject: letter from DEC Wastewater Science Advisory Panel

Dear Mr. Pruitt,

Please find attached a request from the DEC Cruise Ship Wastewater Science Advisory Panel.

Please contact me if you have any trouble opening or viewing the file or questions about the letter. On behalf of the Panel, thank you in advance for your reply.

Best regards,
Krista

Krista L. Webb
Senior Scientist
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Bainbridge Island, WA 98110

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[attachment "110310_RCL.pdf" deleted by Richard Pruitt/SE/MIA/RCL]

Princess Response

1. What were manufacturer's performance specifications for the AWTS? [Hamworthy Membrane Bio-Reactors \(MBR's\)](#) were designed to meet the Murkowski requirements for Fecal Coliform, BOD, TSS limits.
2. How does the system perform compared to those specifications? [Hamworthy Membrane Bio-Reactors \(MBR's\)](#) normally meet these performance specifications.
3. Was the system intended to treat 100% of wastewater in continuous operation? **No**
4. Is wastewater segregated (laundry, galley, black) and are individual streams treated separately or not at all? [Hamworthy Membrane Bio-Reactors \(MBR's\)](#) treats black and accommodations gray water. Laundry and Galley gray waters are segregated from the [Hamworthy Membrane Bio-Reactors \(MBR's\)](#).
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6. What is the ratio of graywater to blackwater treated? There is an approximately 3/1 ratio of graywater to blackwater which is treated by [Hamworthy Membrane Bio-Reactors \(MBR's\)](#).
7. What was the cost of installing the equipment used now (installation, equipment, year installed)? The cost depends on the size of the ship and # of MBR's required. The last ship we installed the MBR system was on the Royal in 2010 which is one of our smaller ships. The cost was \$1,961,750 for the material and labor and \$190,000 for the permeate UV system which totaled \$2,151,750. The Golden which is part of the Grand class was done in 2007 and the cost was approx. \$3.4M.
8. Were they new installations or retrofits? **All retrofits.**
9. What is the annual cost of operating and maintaining the current equipment (including modifications)? The total annual cost of operating is approx \$160k for 11 ships. So it comes out to approx \$14,545/yr for each ship.

PHONE: 206 281 3535
FAX: 206 281 7110

300 Elliott Avenue West
Seattle, Washington 98119

January 27, 1011

Krista Webb
Project Manager
Oasis Environmental, Inc.
400 Winslow Way, Suite 200,
Bainbridge Island, WA 98110

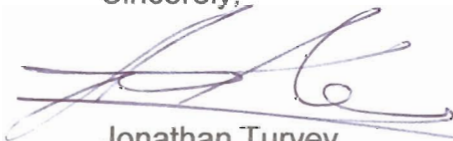
Dear Ms. Webb:

The attached table is submitted in response to your information request dated January 7, 2011 regarding advanced waste water purification systems (AWWPS) for the nine Holland America Line vessels that have sailed in Alaska waters over the last several seasons

As noted in the table, we are in the process of retrofitting two ships (Westerdam and Noordam) with an OVIVO treatment system to augment the Rochem system currently on board. The specifications for the OVIVO system were set at the limits contained in the January 2010 Draft permit. This was the draft permit published for public comment at the time we negotiated with the vendor for development of this system. Of course we were knowledgeable of the Alaska Water Quality Standards (formerly referred to as long-term limits in the previous permit), however the vendor was unable to guarantee performance to those limits at that time. The specifications were chosen based on the best available standards at the time the business arrangement was made.

Please contact us immediately if you have further questions or if you think we may be of further assistance in this regard.

Sincerely,



Jonathan Turvey
Deputy Director, Strategic Planning & Analysis

JT/jg

November 4, 2010

Krista Webb
Project Manager
OASIS Environmental, Inc.

Re: Request on behalf of Alaska Cruise Ship Science Advisory Panel

Dear Ms. Webb,

This letter is in response to the information request to Disney Cruise Line by the Alaska Cruise Ship Science Advisory Panel. I hope this information will help the Panel understand the specific operations and logistics of installation of wastewater treatment systems on Disney cruise ships. Disney is committed to doing what is right for the environment.

Both of Disney's ships have a Hamworthy MBR system and the new Disney Dream has a Hamworthy system as well.

Below is specific information for the Disney Wonder which will make its 1st voyage to Alaska in 2011.

- 1) What were manufacturer's performance specifications for the AWTS?
MEPC159(55) and 33 C.F.R.159 Subpart E Discharge of effluents in Certain Alaskan Waters by Cruise Vessel Operations; the system was designed to meet the MURKOWSKI standards. About 1 year after the installation was completed, we are now also able to meet requirements as, outlined in 33 C.F.R.159 .
- 2) How does the system perform compared to those specifications?
Compliant
- 3) Was the system intended to treat 100% of wastewater in continuous operation?
Yes
- 4) Is wastewater segregated (laundry, galley, black) and are individual streams treated separately or not at all?
Mixed
- 5) If 100% of waste stream is not treated, what percentage of gray vs. black water is treated?
N/A
- 6) What is the ratio of graywater to blackwater treated?
Flow rate for individual waste streams were not measured. Estimated gray : black ratio = 6.6 : 1
- 7) What was the cost of installing the equipment used now (installation, equipment, year installed)?
Approximately \$6.0m / ship to install Hamworthy system in 2009
- 8) Were they new installations or retrofits?
Retrofits
- 9) What is the annual cost of operating and maintaining the current equipment (including modifications)?
Approximately \$500k to run / year

I hope this information will be helpful to the ADEC Science Panel as they continue down a very difficult road to determine the future of the program. Please let me know if you have any concerns about this information or if you have additional questions.

Thank You,

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