

Jankowiak, Amy (ECY)

From: Marshall, Randall (ECY)
Sent: Wednesday, January 21, 2009 3:10 PM
To: Jankowiak, Amy (ECY)
Subject: Norwegian Cruise Line samples

Amy,

The Norwegian Star was sampled on 8/16/08. Total ammonia in the sample was 24.3 mg/L and conductivity was 789. Both the 96-hour topsmelt and 48-hour mysid acute tests had NOECs of 25% effluent meaning that 4:1 dilution removed the toxicity. The topsmelt LC50 was 39% effluent and the percent survival in 100% effluent was 10%. The mysid LC50 was 89.4% effluent and the percent survival in 100% effluent was 42.5%.

The Norwegian Pearl was sampled on 9/7/08. Total ammonia in the sample was 32 mg/L and conductivity was 589. The 96-hour topsmelt acute test had an NOEC of 25% effluent meaning that 4:1 dilution removed the toxicity. The topsmelt LC50 was 72.8% effluent and the percent survival in 100% effluent was 35%. The 48-hour mysid acute test had an NOEC of 50% effluent meaning that 2:1 dilution removed the toxicity. The mysid percent survival in 100% effluent was 90% indicating that the LOEC of 100% effluent may have been a statistical artifact. There was no mysid LC50 because no more than 10% died.

I believe that the Norwegian Star sample had another toxicant besides ammonia. Samples from both ships had ammonia concentrations in the range causing acute toxicity to fish. Mysids are less sensitive to ammonia. The Norwegian Pearl sample was only toxic to fish and ammonia seems to be the cause. The Norwegian Star sample was toxic to both fish and mysids. The Norwegian Star sample was also more toxic than the Norwegian Pearl sample even though the ammonia concentration was lower. Conductivity was much higher in the Norwegian Star sample indicating that the toxicant may have been ionic. Surfactants from detergents in the Norwegian Star sample may be top blame. Metals are also a possibility but mysids tend to be more sensitive to metals than fish but were a little less sensitive to the Norwegian Star sample.

Randall Marshall
WET Coordinator
WA State Dept. of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600
360-407-6445
rmr461@ecy.wa.gov
WA WET webpage:
<http://www.ecy.wa.gov/programs/wq/wet>

Link Code	Sample Date	Start Date	Lab	Title	Organism	Material	Source	Endpoint	NOEC	LOEC	PMSD
RMAR301	09/17/05	09/18/05	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Holland America Cruise Ship	96h Survival Rate	12.5	25	28.91%
RMAR302	09/17/05	09/18/05	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Holland America Cruise Ship	48h Survival Rate	25	50	6.54%
RMAR576	09/27/05	09/28/05	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Norwegian Star	96h Survival Rate	25	50	24.28%
RMAR575	09/27/05	09/28/05	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Norwegian Star	48h Survival Rate	50	100	8.11%
RMAR670	06/04/06	06/06/06	Nautilus Environmental	Echinoid Fertilization Test	Strongylocentrotus purpuratus (Purple Sea Urchin)	Ship Black Water (or combined)	Norwegian Star	Fertilization Rate	< 6.25	6.25	5.84%
RMAR746	09/08/06	09/09/06	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Zaandam	96h Survival Rate	25	50	21.02%
RMAR745	09/08/06	09/09/06	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Zaandam	48h Survival Rate	< 6.25	6.25	18.93%
RMAR750	09/09/06	09/10/06	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Oosterdam	96h Survival Rate	25	50	20.62%
RMAR749	09/09/06	09/10/06	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Oosterdam	48h Survival Rate	50	100	18.79%
RMAR748	09/10/06	09/11/06	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Westerdam	96h Survival Rate	25	50	14.84%
RMAR747	09/10/06	09/11/06	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Westerdam	48h Survival Rate	25	50	12.20%
RMAR1305	08/16/08	08/16/08	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Norwegian Star	48h Survival Rate	25	50	9.61%
RMAR1306	08/16/08	08/16/08	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Norwegian Star	96h Survival Rate	25	50	30.50%
RMAR1307	09/07/08	09/08/08	Nautilus Environmental	Acute Mysid Survival Test	Americamysis bahia (Atlantic Mysid)	Ship Black Water (or combined)	Norwegian Pearl	48h Survival Rate	50	100	5.66%
RMAR1308	09/07/08	09/08/08	Nautilus Environmental	Acute Fish Survival Test	Atherinops affinis (Topsmelt)	Ship Black Water (or combined)	Norwegian Pearl	96h Survival Rate	25	50	24.10%

NOEC = no observed effects concentration

LOEC = lowest observed effects concentration

PMSD = percent minimum significant difference

Sample Code	Sample Date	Start Date	Lab	Material	Source	Parameter	Measurement Units
RMAR301-302	09/17/05	09/18/05	Nautilus Environmental	Ship Black Water (or combined)	Holland America Cruise Ship	Alkalinity (CaCO3)	360 mg/L
						Conductivity	911 µmhos
						Dissolved Oxygen	4.6 mg/L
						pH	7.51
						Total Ammonia (N)	39.6 mg/L
RMAR575-576	09/27/05	09/28/05	Nautilus Environmental	Ship Black Water (or combined)	Norwegian Star	Conductivity	857 µmhos
						Total Ammonia (N)	35.9 mg/L
RMAR670	06/04/06	06/06/06	Nautilus Environmental	Ship Black Water (or combined)	Norwegian Star	Alkalinity (CaCO3)	76 mg/L
						Conductivity	732 µmhos
						Hardness (CaCO3)	52 mg/L
						pH	6.68
						Total Ammonia (N)	15.4 mg/L
RMAR745-746	09/08/06	09/09/06	Nautilus Environmental	Ship Black Water (or combined)	Zaandam	Total Residual Chlorine	0.03 mg/L
						Alkalinity (CaCO3)	508 mg/L
						Conductivity	971 µmhos
						Hardness (CaCO3)	64 mg/L
						pH	7.77
RMAR749-750	09/09/06	09/10/06	Nautilus Environmental	Ship Black Water (or combined)	Oosterdam	Total Ammonia (N)	52.9 mg/L
						Alkalinity (CaCO3)	236 mg/L
						Conductivity	600 µmhos
						Hardness (CaCO3)	72 mg/L
						pH	7.59
RMAR747-748	09/10/06	09/11/06	Nautilus Environmental	Ship Black Water (or combined)	Westerdam	Total Ammonia (N)	50.4 mg/L
						Alkalinity (CaCO3)	184 mg/L
						Conductivity	499 µmhos
						Hardness (CaCO3)	56 mg/L
						pH	7.3
						Total Ammonia (N)	36 mg/L

POTW	Total Ammonia (mg/L)			Fish % Survival in 100% Sample			Daphnid % Survival in 100% Sample		
	mean	max	min	mean	max	min	mean	max	min
All Tests	16.54	54.80	0.03	75.5%			86.4%		
Aberdeen WWTP	20.83	29.00	7.30	57.9%	92.5%	25.0%	98.8%	100.0%	95.0%
Alderwood WWTP	10.55	11.50	8.70						
Arlington WWTP	0.67	1.00	0.50	98.5%	100.0%	96.7%	97.5%	100.0%	90.0%
Bremerton WWTP	23.10	25.80	21.30	70.6%	100.0%	15.0%	95.0%	100.0%	85.0%
Central Kitsap Plant	32.70	39.90	22.60	0.0%	0.0%	0.0%	43.7%	100.0%	0.0%
Chambers Creek WWTP	41.29	48.80	30.80				35.2%	100.0%	0.0%
Chehalis WWTP	0.77	1.30	0.50						
Edmonds WWTP	23.90	29.40	19.00	75.0%	100.0%	0.0%	98.1%	100.0%	90.0%
Ellensburg WWTP	0.93	2.00	0.50	97.5%	100.0%	92.5%	100.0%	100.0%	100.0%
Enumclaw WWTP	5.30	6.30	4.30						
Gig Harbor WWTP	14.33	24.20	0.50	69.4%	100.0%	15.0%	100.0%	100.0%	100.0%
King County West Point WWTP	22.21	29.10	17.80	86.9%	100.0%	55.0%	100.0%	100.0%	100.0%
Lakota WWTP	29.89	53.70	13.60	34.2%	100.0%	0.0%	69.8%	100.0%	0.0%
Lynden WWTP	0.50	0.50	0.50	88.9%	100.0%	0.0%	98.8%	100.0%	95.0%
Lynnwood WWTP	22.69	30.10	19.20	62.9%	86.7%	15.0%	100.0%	100.0%	100.0%
Marysville WWTP	25.03	35.10	0.50	18.5%	97.5%	0.0%	86.5%	100.0%	0.0%
Miller Creek, SW Suburban Sewer D.	20.10	33.80	13.00						
Oak Harbor STP	35.20	46.90	22.40	61.3%	100.0%	0.0%	61.2%	100.0%	0.0%
Pasco WWTP	15.90	19.70	13.40						
Port Angeles WWTP	21.85	25.00	17.10	56.3%	100.0%	7.5%			
Port Townsend WWTP	0.87	1.70	0.50	98.8%	100.0%	97.5%	96.3%	100.0%	85.0%
Prosser WWTP	1.38	3.30	0.50						
Puyallup WWTP	1.61	6.02	0.03	98.1%	100.0%	92.5%	99.7%	100.0%	95.0%
Quincy Industrial	7.85	14.90	0.50	66.3%	100.0%	0.0%	72.1%	100.0%	0.0%
Tacoma #1	37.34	54.80	11.50	57.7%	97.5%	0.0%	57.8%	100.0%	0.0%
Tacoma #3	28.77	35.80	19.80	76.0%	100.0%	0.0%	98.3%	100.0%	80.0%
Vancouver West STP	13.45	21.40	2.80	79.5%	100.0%	12.5%	98.2%	100.0%	85.0%
Wenatchee WWTP	6.52	17.30	0.50				90.8%	100.0%	45.0%
Yakima WWTP	1.11	4.50	0.50				99.8%	100.0%	95.0%



PRINCESS CRUISES

March 18, 2009

Amy Jankowiak
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, Washington 98008-5452

RECEIVED

MAR 20 2009

DEPT OF ECOLOGY

Dear Mrs. Jankowiak:

Princess Cruises certifies that Star Princess and Golden Princess did not discharge in Washington State while at berth during the 2008 season. Wet testing was not scheduled for these two ships as it was our understanding that this was not required if the ship did not discharge at berth as per the Memorandum of Understanding Cruise Operations in Washington State. We appreciate your recent clarification.

Princess Cruises will instruct its vessels not to discharge while at berth during the 2009 season. This year Princess Cruises would like to request discharge approval for Star Princess, Golden Princess and Pacific Princess for one nautical mile from berth at a port in Washington and traveling at a speed of at least 6 knots.

Please find attached the Vessel Specific Sampling Plans for the above three ships. Once we receive the United States Coast Guard letters of continuous discharge approval from Sector Juneau, Alaska, we will forward these to you.

Sincerely,

A handwritten signature in black ink, appearing to read "Andrew Lorenzana".

Andrew Lorenzana
Environmental Operations Manager
PRINCESS CRUISES
24305 Town Center Drive
Santa Clarita, CA 91355-4999
Office: 661-753-2755