

DESIGN STUDY REPORT

M/V MALASPINA MARINE SANITATION DEVICE SYSTEM UPGRADES

ADOT&PF Project No. 73028

Prepared for:

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On

June 10, 2008



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M/V MALASPINA MARINE SANITATION DEVICE UPGRADES

1. SUMMARY

The Alaska Marine Highway System (AMHS) passenger ferries have been experiencing difficulties in complying with mandatory waste water quality standards in a consistent manner. Due to the high cost of equipment and physical constraints in installing improved waste water treatment systems in the ferries, the Alaska Department of Environmental Conservation (ADEC) approved the vessels operation under the Best Management Practices (BMP) Plan. According to the Alaska Statute, all BMPs will expire no later than December 31, 2015. In keeping within the approved plan, AMHS is required to continue improvements to the Marine Sanitation Devices on their vessels, to remain in regulatory compliance. To this end, AMHS has commissioned study teams to assess the condition of the marine sanitation devices (MSDs) on their vessels and to make recommendations.

The *Malaspina* MSD system has been evaluated by the study teams with the following major recommendations:

- The Omnipure 15MX system should be maintained and operated in keeping with the manufacturer's recommendations to maintain the USCG certification of the MSD system.
- The current single bookcells (15MX) should be replaced with double bookcells (15MXMP) to maintain the MSD efficiency while the vessel passes through low salinity areas.
- The sewage collection tanks should be equipped with Lead/Lag control system to enable 'in port'/at sea' operations of the MSD.
- Addition of a new de-chlorination system to the MSD system will limit effluent residual chlorine levels within statutory limits.
- Imparting of formal training to the crew by factory trained/qualified technical personnel will improve system performance.
- Comply with the 'designated' water requirements of Alaska, Canada and Washington State, while the vessel transits through their respective territories.

The above upgrades, at a cost of \$309,330.00, will improve the overall performance of the MSD system and assist in complying with the regulatory standards in a consistent manner. Manufacturer lead time for supply of the equipment for the upgrades is approximately 12 weeks.

2. MSD SYSTEM OVERVIEW

The Alaska Marine Highway System (AMHS) Passenger - RO/RO ferry *M/V Malaspina* Marine Sanitation Device (MSD) system comprises of three skid mounted Omnipure 15MX modules along with their macerators, transfer and discharge pumps, control panels and a 2,929 gallon (V2) processing tank. A schematic layout of the MSD system is included in Appendix A. Ship's sewage comprising of gray water (deck drains, showers, sinks, etc.) and black water (toilets and urinals) from the forward section of the vessel is collected by gravity to the Forward (7,112 gallon) collection tank (V1) located in the MSD Room on the Lower deck, while the sewage from the vessel aft section is collected in the Aft (1,894 gallon) collection tank (V3) located in the shaft space of the Lower deck. The sewage from the V3 tank is periodically pumped into the V1 tank by two sewage transfer pumps. The raw sewage (influent) from the V1 tank is macerated / ground to fine particles and pumped through the three pairs of single bookcells along with equal quantity of seawater.

The electrically energized bookcells oxidize and disinfect the macerated raw sewage by means of electro-chemical reaction in the bookcell. The processed sewage (effluent) is collected through the 'downcomer' pipes into the V2 tank. Small amounts of hydrogen, carbon dioxide and other gases produced during the oxidation process in the bookcells are extracted from the V2 tank by positive (forced) exhaust. The V2 tank is sized to provide a minimum of 30 minute retention time between the entry of treated sewage at the bottom of the tank and subsequent discharge from the top of the V2 tank to the sea. The 30 minute retention time assures that any remaining bacteria will be exposed to the produced hypochlorite/chlorine and killed. This time also allows for any partially oxidized particles to settle at the bottom.

The particles (consisting mostly of cellulose) are periodically re-circulated into the V1 tank through the blowdown line during the back flush and blow down maintenance. The processed effluent is then pumped overboard by three (20 gallon each) discharge pumps. The system is configured to bypass the Omnipure units in the event raw sewage is required to be pumped ashore directly without processing.

When the vessel passes through areas of low salinity, the oxidation process in the bookcells will be inadequate. Under such conditions, the ship staff manually injects liquid chlorine into the processed effluent as it reaches the V2 tank. The liquid chlorine kills the fecal coliform bacteria and disinfects the effluent. The ship staff regularly checks the residual chlorine in the effluent and takes corrective measures to remain within Alaska Department of Environmental Conservation (ADEC) statutory limits. The process is aimed to drastically reduce the dangerous fecal coliform bacteria and total suspended solids in the processed effluent and maintain within the regulatory limits.

The *Malaspina* MSD system has not been able to perform efficiently over the years in a consistent manner and is unable to comply with mandatory state regulations in the current condition.

3. PROBLEM STATEMENT

Alaska Marine Highway System intends to upgrade the vessel Omnipure 15MX MSD system to resolve the several operational deficiencies in complying with the current regulations highlighted during the following surveys and inspections.

- Severn Trent De Nora Team. : Inspection of the Omnipure MSD System and machinery reliability interviews on March 21 and 22, 2006 (Appendix B).
- The Glosten Associates. : The Fleet Condition Survey carried out by in September 2006 (Appendix C).
- Alfa Tec, Inc. : Ship check carried out from January 16 thru 18, 2008 (Appendix D).

The above inspections and shipcheck highlighted following major operational deficiencies of the Omnipure MSD system.

- a) Inadequate instrumentation for the MSD system to monitor influent and seawater flow through the bookcells and thus a lack of 'system performance at a glance' for the ship staff.
- b) The MSD system does not provide a mechanism to limit residual chlorine in the processed effluent; thus permitting residual chlorine levels to remain unchecked while discharging overboard.
- c) No collection tank level control system is in use for optimizing the MSD system performance for 'at sea' and 'in port' operations, a requirement to be implemented under the approved BMP Plan.
- d) While most of the piping in the influent and effluent lines is PVC, some steel piping still remains, prone to severe corrosion.
- e) The Omnipure system runs in 'override' mode when brackish water or low salinity conditions are encountered with bookcell voltages reaching 80 to 90 amps and causing system safety shut downs. Typically, 15% of the vessel operation time during summer is attributed to such brackish/low salinity conditions.
- f) The shore transfer pump typically used to back flush the contents from the processing tank V2 to the collection tank V1 does not have an isolation valve in the overboard discharge line. This raises the possibility of accidental overboard discharge of inadequately processed effluent in the event the check valve leaks or nonfunctional.

(Please see Section 6 and 9 and Appendices B, C and D for detailed findings and recommendations.)

The proposed upgrades, as discussed in the succeeding paragraphs, will enable the Omnipure MSD system to operate efficiently in a consistent manner and remain in strict compliance with the ADEC Best Management Practices (BMP) Plan approved on August 7, 2007.

4. REGULATIONS

4.1 USCG Requirements:

All sea going vessels are required to be fitted with Marine Sanitation Device systems of Type I, II or III in accordance with 33CFR159 based on the type and size of a vessel. The Type II MSD regulation stipulates that the maximum levels of fecal coliform bacteria not exceeding 200 parts/100 ml of water, and total suspended solids not exceeding 150 mg/l in the processed sewage (effluent) can be discharged into the water safely. The Type I MSD system, with higher levels (up to 1,000 parts/100 ml) of such fecal coliform, may be fitted only in vessels of 65' in length or less. A copy of the 33CFR159.5 is included in Appendix E.

Types of USCG Approved Marine Sanitation Devices are as follows:

- a) Type I : This system is a flow through device that, under the test conditions as described in 33CFR159.121, produces effluent having a fecal coliform bacteria count no greater than 1,000/100 ml, and no visible floating solids.
- b) Type II : A flow through discharge device that, under the test conditions as described in 33CFR159.121, produces effluent having a fecal coliform bacteria count no greater than 200/100 ml, and suspended solids no greater than 150 mg/l.
- c) Type III : A device designed to prevent the overboard discharge of treated or untreated sewage, or any waste derived from sewage. Most Type IIIs are holding tanks, but there are also vacuum collection systems, incineration systems, recirculation systems and a composting system.

4.2 Alaska Requirements :

The Alaska Statutes (AS) 46.03.460 thru 463 mandate a vessel's MSD management practices and sets limits for effluent quality while discharging into the Alaska waters. An extract of the statutes is included in Appendix F. The *Malaspina* operates in Alaskan waters regulated by the Alaska Department of Environmental Conservation (ADEC).

The ADEC has also mandated that Commercial Passenger Vessels (CPVs), including AMHS vessels, participate in the Commercial Passenger Vessel Environmental Compliance (CPVEC) Program. A CPV is defined as a vessel that carries passengers for hire, except where it carries less than 50 passengers or less than 50 overnight passengers (by lower berth), or is a US or foreign government operated vessel (AS 46.03.490). A Small CPV is one, which carries 249 or fewer overnight passengers (by lower berth), and a Large CPV is one, that carries 250 or greater overnight passengers (by lower berth).

The ADEC regulations stipulate that a Large CPV not discharge treated waste (200p/100ml fecal coliform for Type II MSDs) unless underway at 6 knots and one nautical mile from shore or where it complies with effluent requirements of Federal Cruise Ship regulation, Title XIV – Certain Alaskan Cruise Ship Operations. Small CPVs are only required to meet the MSD Type II criteria and limit fecal coliform $\leq 200/100$ ml, total suspended solids ≤ 150 mg/l and residual chlorine < 5 PPM.

Large and Small CPVs that discharge effluent through a USCG certified Type II MSD, while underway, must take at least two effluent samples per cruise season. The vessel operators are required to log and report the sampling results to the ADEC.

Most Large CPVs, including large cruise ships, have installed advanced treatment systems that meet the more stringent Federal Cruise Ship requirements and may discharge at all times without restrictions. Only one model of the advanced water treatment system (Hydroxyl) is known to have been approved by the USCG.

Small CPVs including the AMHS vessels, which use the traditional USCG certified Type II MSD systems are permitted to normally discharge into the Alaska waters except in the 'no discharge' zones (Herring spawning areas) as identified by the ADEC.

4.3 Transport Canada Requirements :

All vessels are required to comply with Canada Shipping Act 2001 (SOR/2007-86) : *Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals*, while taking passage through the Canadian waters. US Flag passenger vessels are required to be fitted with USCG approved MSD of type II. If the vessel transits through any of the 'designated' area as listed in Schedule 4 of the regulations, the effluent standards shall be in keeping with 'designated' water quality as defined in the Act.

Full text of the Canada Shipping Act 2001 Regulations can be accessed on-line at :

<http://www.tc.gc.ca/acts-regulations/GENERAL/C/csa/regulations/400/csa450/csa450.html>

AMHS may like to investigate the transit routes of the vessels.

4.4 Washington State Requirements :

All vessels are required to comply with State of Washington Administrative Code (WAC) 173-201A-210 : *Marine Water Designated Uses and Criteria*, while operating in the waters of Washington State. Vessels are required to meet the extraordinary water quality standards while passing through the 'designated' areas of the state.

Full text of the document may be viewed on-line at :

<http://www.ecy.wa.gov/pubs/wac173201a.pdf>

Table 612 of the above document lists specific water bodies and their 'designated' uses. Some of the areas the AMHS vessels transit through Washington State appear to be categorized as extraordinary quality.

4.5 AMHS Responsibilities :

The *Malaspina* is a U.S. registered vessel, 408 ft long and is required to be fitted with Type II (flow through discharge device) MSD to comply with USCG regulations 33 CFR Part 159. The current Omnipure 15MX MSD system is a Type II system and complies with the current USCG regulations.

The *Malaspina* has more than 50 and less than 249 overnight passengers (by lower berths) and is therefore required to participate in the Commercial Passenger Vessel Environmental Compliance (CPVEC) Program as a small CPV, in accordance with the

ADEC rules. In keeping with the CPVEC program, the vessel is required to have a USCG certified Type II MSD and meet the requirements of AS 46.03.463 c) – e).

As the *Malaspina* does not meet the ADEC statutory regulations as a small CPV, in maintaining the effluent quality in a consistent manner, the vessel is required to comply with the Best Management Practices (BMP) Plan approved on August 7, 2007. According to the BMP Plan, the vessel may not discharge effluent with fecal coliform colonies with more than 200/100 ml of water and total suspended solids not exceeding 150 mg/l of water. The residual chlorine in the treated effluent is not to exceed 5 PPM. In particular, AMHS is required to demonstrate the MSD system improvements, to remain in ADEC regulatory compliance.

The *Malaspina* is required to comply with the Canada Shipping Act 2001 (SOR/2007-86) : *Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals*. The vessel, while transiting through 'designated' water of Canada, is required to maintain effluent quality of fecal coliform (FC) levels $\leq 14/100$ ml, total suspended solids (TSS) ≤ 50 mg/l, 5-day biochemical oxygen demand (BOD) ≤ 50 mg/l and residual chlorine ≤ 0.5 mg/l.

The *Malaspina* is required to comply with State of Washington Administrative Code (WAC) 173-201A-210 : *Marine Water Designated Uses and Criteria*, while transiting through the 'designated' waters of Washington State. The vessel is required to maintain effluent standards of dissolved oxygen ≤ 7.0 mg/l, turbidity ≤ 5 nephelometric turbidity units (NUT), pH ≤ 7.0 to 8.5, fecal coliform bacteria $\leq 14/100$ ml and residual chlorine ≤ 7.5 μ g/l (daily), while passing through the 'designated' waters.

Table 4.1 illustrates the regulations (mandatory limits) and recommended (not regulated) guidelines for five important elements of the effluent and the recent two years of *Malaspina* test results. The historical test data of the *Malaspina* is included as Appendix G.

Table 4.1 : Effluent Standards and *Malaspina* Effluent Results

Parameter	IMO Annex IV	USCG 33CFR159 (Type II)	ADEC AS46.03.462 (Mandatory)	ADEC (Recommended) (See Appendix J)	MAL 1/2008	MAL 5/2007
Fecal Coliform colonies/100 ml	250	200	200	43 (Daily) 20 (Monthly aver)	N/A	<10
Residual Chlorine mg/lit	As low as possible	Not specified	5	0.0075	16	24.8
Total suspended solids mg/lit	100	150	150	150	N/A	43
Biological Oxygen Demand mg/l	50	Not specified	Not specified	60 (Daily) 30 (Monthly aver)	N/A	51.3
Oil & Grease μ g/lit	50	Not specified	Not specified	10 & 15	N/A	N/A

Note:

The *Malaspina* effluent results shown in the table are an extract from the Waste water historical data (Appendix G) and Admiralty Reports.

4.6 PENDING FUTURE REGULATIONS :

4.6.1. ADEC :

In accordance with Alaska Statute 46.03.463, the Best Management Practices Plans of all vessels will expire no later than December 31, 2015. Based on the available information from the ADEC, upon the expiry of the BMPs, the AMHS vessels will be required to follow the same effluent quality standards as set out in the BMPs. According to the ADEC, the Alaska State Legislature has not made any changes to the laws so far and no changes in the effluent quality are expected anytime soon.

(The ADEC *Best Management Practices Approval Criteria* (Appendix H) stipulated the expiry date for all vessel BMPs as December 31, 2016. To an enquiry regarding two different dates of expiry for the BMPs, the ADEC has advised HMG that December 31, 2015 as promulgated by the Alaska Statute should be treated as final.)

The ADEC has confirmed that they are not aware of any regulations that would require installation of 'advanced' water treatment systems in small passenger vessels. Please see ADEC e-mail dated February 21, 2008 in Appendix J.

4.6.2. IMO :

The revised MARPOL Annex IV will come in to force on September 27, 2008. Details of the revised Annex IV are as follows:

The revised Annex IV applies to new and existing ships engaged in international voyages, which are of 400 tons gross tonnage and above or are certified to carry more than 15 persons. Existing ships shall comply with the provisions of the revised Annex IV five years after the date of entry into force of the Annex.

Every ship to which Annex IV applies shall be equipped with either a sewage treatment plant or a sewage comminuting and disinfecting system or a sewage holding tank.

The discharge of sewage into the sea is prohibited, except when the ship:

- has in operation an approved sewage treatment plant; or
- is discharging comminuted (macerated) and disinfected sewage using an approved system at a distance of more than three nautical miles from the nearest land; or
- is discharging sewage which is not comminuted or disinfected at a distance of more than 12 nautical miles from the nearest land.

When a Party to Annex IV requires ships operating in the waters under its jurisdiction and visiting ships to comply with the above-mentioned discharge requirements, then it shall ensure the provision of adequate facilities at ports and terminals for the reception of sewage.

The performance tests of new MSD installations on or after January 1, 2010 will be evaluated to revised restricted standards, in accordance with IMO Marine Environment Protection Committee Resolution 55/23 adopted on October 16, 2006.

The US is not a signatory to MARPOL Annex IV and hence the above regulations do not apply to US flag vessels operating in the US waters. Accordingly, the revised MARPOL Annex IV does not affect the AMHS vessels operating in the US waters.

4.6.3. USCG/EPA :

According to the Marine Safety Center (MSC), Washington DC, the USCG and EPA are currently evaluating the impact of the IMO resolutions on the US flag vessels in the international arena. The MSC has confirmed that the AMHS vessels will not be affected so long as the vessels' type II MSDs continue to perform satisfactorily. Should any new regulations with stricter standards come into force in future, typically existing vessels with working MSD systems will likely be granted immunity under a 'grandfather' clause.

4.6.4. Transport Canada :

Transport Canada authorities have confirmed that the Canada Shipping Act 2001 is being amended at this time and the new rules, with more stringent limits for the effluent discharge, will be enacted in 2009. No firm date is set for the enactment at this time. The Canadian authorities follow MARPOL regulations in general. According to Transport Canada, in so far as the AMHS vessels are concerned, satisfactorily working USCG approved type II MSD systems should suffice in future as well, while they transit through the Canadian waters, excepting in the 'designated' areas. However, should the vessels choose to stop at any of the Canadian ports, the port authorities may exercise or invoke the right to inspect the MSD systems for satisfactory performance, should such an occasion arise.

The AMHS vessels are required to comply with the 'designated' area requirements in keeping with the Canada Shipping Act 2001 without exception.

4.6.5. Washington State :

The Department of Ecology, Water Quality Program Group, regulates the surface water quality standards in the State. The Water Quality Program Group, and a few Washington legislators, are in consultation with the EPA at present to impose additional restrictions on the surface water quality to be maintained by the vessels discharging treated effluent into the State waters. Efforts are also in hand by this group to introduce a legislation to impose a 'no discharge' rule for the entire Puget Sound area, as done in several other states.

5. BEST MANAGEMENT PRACTICES (BMP) PLAN

Alaska law requires that the owners/operators of small (50 to 249 overnight passengers, as measured by lower berths) commercial passenger vessel register under the Commercial Passenger Vessel Environmental Compliance Program (CPVEC). The vessel may not discharge wastewater in Alaska waters unless the vessel meets standard terms and conditions under Alaska Statute (AS) 46.03.462(b) or alternative terms and conditions (AS 46.03.462(c) or AS 46.03.462 (e)). AS 46.03.462 (e) covers vessels whose keel was laid before January 1, 2004 and allows operation under a Best Management Practices (BMP) Plan. The BMPs include practices that protect the environment to the maximum extent feasible.

Alaska Marine High System (AMHS) operates eleven (11) Passenger - RO/RO ferries, five (5) of which are regulated by the Alaska Department of Environmental Conservation's

Commercial Passenger Vessel Environmental Compliance Program. The MSD systems on these five vessels (*Matanuska*, *Malaspina*, *Columbia*, *Kennicott* and *Taku*) were not able to maintain satisfactory sustained performance over the years with effluent quality ranging from substandard to satisfactory. At times the effluent quality was well beyond the limits of Type II USCG standards and ADEC regulations.

Space limitations in these vessels, coupled with high cost and lack of readily available USCG approved advanced water treatment systems suitable for installation in these vessels, have precluded any major upgrades or replacements and therefore the vessels operate under the aforementioned BMP rather than the strictly meeting the AS requirements and continue to operate with AMHS assured improvements. Accordingly, all the five vessels were given approvals by the Alaska Department of Environmental Conservation to operate under the BMP Plans. The *Malaspina* was approved to operate under the BMP Plan on August 7, 2007. The BMP Plan is valid for a period of 3 years from the date of approval. A copy of the vessel approved BMP is included as Appendix K.

The salient features of the BMP Plan approval are as follows.

- AMHS will continue to work towards improvement to the current waste water system and possible purchase of 'advanced' MSD system before the year 2012.
- Wastewater will be tested daily for checking total residual chlorine levels
- Residual chlorine levels will be maintained in the range of 0 to 5 ppm
- System checks to be performed and remedial measures taken in the event there are two or more consecutive zero (0) levels of chlorine.
- Should residual chlorine levels be higher than 5 ppm, necessary steps will be taken to reduce the levels.
- Each vessel will maintain all relevant documentation onboard.
- A three position switch to be installed to enable in port and at sea operations.
- Formal training program on the MSD system will be implemented.

6. SHIPCHECK, INSPECTION AND DETAILED FINDINGS

The Fleet Condition Survey, Shipcheck and Systems Inspections carried out by the teams referenced in Section 3 above identified the following design deficiencies in the MSD system and its operations in meeting the current ADEC regulatory requirements.

- 6.1 The Omnipure 15MX MSD, Type II unit is an open loop design wherein the system lacks the ability to correct itself automatically to maintain effluent quality standards in a consistent manner. For a given system performance, the effluent quality is largely dependent upon the composition of the influent in the collection (V1 and V3) tanks. The number of passengers and areas of vessel operation (low salinity regions) greatly influence the MSD system performance and quality of the effluent fluctuates widely and remains uncontrolled without manual system adjustments. In the present arrangement, manual adjustments to the MSD system are therefore necessary to limit the residual chlorine levels in the effluent. Changes to the system settings without approval of the cognizant authorities in effect void the unit certification by the USCG.
- 6.2 The MSD system is not provided with adequate instrumentation to monitor seawater salinity and flow rates at critical junctures in the MSD system, such as discharge rates of the macerators, flow rate of seawater to the bookcells, etc. In the absence of such instrumentation, the ship staff is severely handicapped and unable to have a snapshot

picture of the MSD system performance. The ship staff largely relies on constant monitoring of the system and sampling for the residual chlorine levels in the effluent from the DEC test point in the overboard discharge line. Currently the ship staff is only equipped to monitor the residual chlorine levels in the effluent by titration method and lacks the capacity to verify fecal coliform bacteria or the total suspended solids. The latter tests are normally performed twice a season by an independent ADEC approved laboratory. With the typical workload of the engineering personnel onboard, such monitoring of the MSD system becomes infrequent at times, with substandard quality of effluent going overboard occasionally. The random fecal samplings from 2001 thru January 2008 have shown very high levels of fecal coliform bacteria and total suspended solids during the years 2001 thru 2005. The residual chlorine levels remain higher than the limits allowed. The Chief Engineer weekly reports during the months of July and August 2007 indicate very low residual chlorine levels typically as a result of passing through areas of low salinity (copies of C/E weekly reports are included in Appendix L). Such low salinity normally results in low chlorine generation and likely higher fecal coliform bacteria levels in the effluent unless chlorine injection was done in a timely manner. This phenomena is considered seasonal and a common occurrence each year.

- 6.3 The Omnipure 15MX MSD system single pass bookcells are not able to sustain and operate efficiently during the vessel's passage through brackish/low salinity areas when the salinity range drops to 0.5 ppt to 18 ppt. Low salinity in the seawater results in inadequate sodium hypochlorite/chlorine generation with increased amperage of the bookcells. The high amperage leads to frequent and automatic system safety overload shutdowns. The ship staff typically attempts to manually increase the amount of seawater passing thorough the bookcells in an effort to improve chlorine generation and sustain system operation. In doing so, the system parameters are greatly altered from the approved manufacturer settings. Attempts are also made by the ship staff to inject 15% liquid chlorine into the processing tank (V2) when chlorine generation continues to be insufficient to kill the fecal coliform bacteria.



Photo 6-1 : External Chlorine Injection Tank



Photo 6-2 : External Chlorine Injection Distribution Manifold

- 6.4 In accordance with the approved BMP Plan, the vessel is not allowed to discharge effluent overboard with high levels of residual chlorine ≤ 5 ppm or total suspended solids ≤ 150 mg/l. The ADEC in a separate communication to Harbor Marine Group has suggested that efforts be made to limit chlorine levels to not exceeding 0.1 ppm as the State Legislature is currently considering imposing additional restrictions on the quality of the marine effluent. (Appendix J).
- 6.5 The Omnipure 15 MX MSD, Type II system with single pass bookcells and its current factory settings cannot achieve a consistent level of residual chlorine in the effluent (not exceeding 5 ppm) and residual chlorine levels as high as 60 ppm were recorded during the last shipcheck in January 2008. In order to meet this requirement of low residual chlorine levels in the effluent, the ship staff makes changes to the system settings with no guidance from the equipment suppliers or manufacturers. Some of the typical changes observed were changes to orifice plates in the macerator pump discharge lines, and varying seawater input to the bookcells by throttling or increasing, etc. (See Omnipure representative reports in Appendices B and D).
- 6.6 Adequate quantity of chlorine generation in the bookcells is essential to oxidize the influent and sufficiently eliminate the fecal coliform bacteria. The residual chlorine after such oxidation process will be based on the quality of the influent passing through the bookcells and remains unpredictable. Unchecked residual chlorine levels can vary anywhere from 0 to 80 PPM and higher in the effluent. Limiting chlorine generation in the bookcells in order to contain residual chlorine in the effluent, on the other hand can have deleterious effects of higher fecal coliform bacteria in the treated effluent going overboard. No clear guidelines were provided by the MSD manufacturers until this time as to how the residual chlorine levels can be effectively controlled in the effluent going overboard and maintain within regulatory limits. Detailed discussions with the Severn Trent De Nora team brought out that the manufacturers were never informed by AMHS in the past of the BMP Plan requirements.
- 6.7 The collection tanks (V1 and V3) level controls for the transfer pumps and macerators are not currently configured for optimum system performance. These tanks do not maintain the minimum levels of influent at all times during operations at sea, whereby the influent tends to remain unprocessed at times for prolonged periods, raising the levels of fecal coliform due to somewhat long retention. As the bookcells age with likely drop in

efficiency, fecal coliform levels in the effluent tend to increase beyond acceptable limits. This method of not maintaining minimum levels of sewage (influent) in V1 and V3 tanks during operations at sea sometimes imposes severe restrictions on sewage collection while the vessel remains in port (vessels are not permitted to discharge effluent overboard during port operations). There were reported instances of sewage overflow from the retention tanks and the subsequent difficulty of cleaning the spill. The exposed raw sewage is also a potential safety hazard for the ship staff.

- 6.8 Two out of three vacuum gauges on the positive vent lines on V2 tank were found to be non operational. The gauges provide a positive indication of the correct venting of the system.



Photo 6-3: Non Operational Center Vacuum Sensor and Gauge



Photo 6-4 : Non Operational Port Vacuum Sensor and Gauge

- 6.9 Discussions with the Chief Engineer and 2nd A/E brought out that most of the engineering personnel are 'on the job' trained from the previously experienced personnel onboard. No formal training is imparted to any of the crew members. The current technical manuals provide very limited information on the typical problems the vessel encounters and

therefore are not commonly referred to by the ship staff. The current manuals also reportedly lacks in technical content of the system settings and operating conditions. A review of the manuals onboard by the HMG team has confirmed the ship staff complaint as being valid.

7. MSD DESIGN AND OPERATION CONSIDERATIONS

- 7.1 Double Bookcells : The existing single bookcells (model #12MX) of the Omnipure MSD system are designed to satisfactorily operate with salinity levels of 14 ppt and above. These bookcells are inefficient in brackish/low salinity areas. In order to improve the efficiency of the system, the single pass bookcells may be replaced with double pass bookcells (model #15MXMP), which are designed for salinity as low as 7 ppt. The double bookcells also feature an automatic reverse flow of seawater when the system is switched off. This reverse flow removes any clogging of the influent that may have occurred between the plates during the normal flow conditions. The maintenance on the double bookcells is relatively low (cleaning after 300 hours of operation) compared to the single bookcell (cleaned after every 75 hours of operation).

While the new 15 MXDP double bookcells do not totally solve the problems of the MSD during vessel operations in low salinity areas, based on the experience gained on *LeConte*, these units are reportedly more efficient and help drastically reduce the maintenance effort and attention the ship staff is required to provide otherwise. Even with the double bookcells, *LeConte* has reportedly been injecting additional seawater into the collection tank V1 to sustain sodium hypochlorite/ chlorine generation, while passing through low salinity areas or when undue high volume of freshwater (rain) is received in the collections tanks from the deck drains. The Chief Engineer, *LeConte* confirmed that the vessel does not use any liquid chlorine injection into the processing tank V2.



Photo 7-1 : Skid Mounted Single Pass 12MX bookcells and Control panel

Unlike the total skids replacement as done on *LeConte* and *Aurora*, only the bookcells are proposed to be replaced in *Malaspina* along with their control panels while retaining the existing skids. The PVC piping will be suitably modified to suit the new double bookcells. The existing macerators and transfer pumps will be used with the upgraded bookcells system. This will avoid the expense of creating bigger openings in the bulkheads and

decks, as the skid mounted double bookcells cannot pass through the existing openings in the vessel. A typical schematic arrangement of the double bookcells used in *Aurora* is included in Appendix M for information. The skid size for *Malaspina* will remain the same as before.

- 7.2 Control Panels : New 15MXMP treatment skid control panels will support the new double bookcells. The new panels will be equipped with operator interface terminal (OIT) instead of individual switches. The status lights are also replaced by flashing text messaging in the new panels. Except for these cosmetic changes, the philosophy of the control panel is similar to the earlier version.
- 7.3 Treatment Flow Meters : The macerator pump discharge lines are to be equipped with permanently mounted ultrasonic flow indicators. These flow indicators will be capable of communicating with the control panel to establish correct flow rates in the system. The meters will be field mounted on each process module skids and are a new addition to the MSD system. They will provide a snapshot of the system performance.
- 7.4 Collection Tank Level Control Panel : The existing level control panel on the vessel does not utilize optimum system performance logic of maintaining the minimum level of influent in the V1 and V3 tanks. Maintaining minimum levels of influent in the collection tanks ensures that raw sewage is not retained onboard unduly long periods of time and the problems associated with possible high fecal coliform bacteria. In addition, processing the influent as it is collected, also provides adequate collection capacity in the tanks as the vessel reaches the terminal. The proposed new 'Lead/Lag' Level panel ensures minimum levels of influent in the V1 and V3 tanks at all times while running the system at sea and maximizing the influent retention capacity while in port. The 'in port' / 'at sea' switching feature for operating the MSD is one of the required improvements as per the approved BMP Plan. The desired minimum and maximum levels in the tanks can be adjusted easily with no major changes to the system. The system is similar to the PLC based control system recommended by Electric Power Systems, Inc., in September 2006.
- 7.5 De-Chlorination System : Installing a De-Clor system is considered essential, to combat high residual chlorine levels in the effluent. The De-Clor system injects liquid sodium bisulphate into the effluent before discharging overboard. Sodium bisulphate neutralizes any free/residual chlorine in the effluent after the sewage passes through the bookcells. The De-Clor system comprises of a storage tank, control panel, two injection pumps, analyzer /controller and the associated piping. A sensor installed in the discharge line in the system provides a closed loop feedback to the controller which regulates the injection rate of the chemical. The control panel provides an audio/visual indication of the quality of the effluent for chlorine. The De-Clor system is considered key in complying with the ADEC residual chlorine levels in the effluent, as the Omnipure 15MXMP MSD system alone cannot meet this need. A typical schematic of the location of the De-Clor is included in Appendix N.
- 7.6 Operations Manual : With the upgraded MSD system, it is considered necessary to provide revised operations manual to the vessel. The current operations manual was found to be grossly inadequate in terms of fault finding, remedial measures and system technical details. The Technical Manager of Severn Trent De Nora was in agreement with this observation and expressed the need to update the manual.

- 7.7 Training : Upon completion of the system upgrade, onboard training of both the crews by the factory certified engineer/ technician is considered an important step in clearly understanding the need to maintain factory settings of the system and methods of exercising control for residual chlorine levels in the effluent. The opportunity also provides for one to one interaction with the manufacturer's representative, where practical problems not covered in the standard operations manual can be discussed and resolved.
- 7.8 Additional Instrumentation : The vessel currently has no means of checking the seawater salinity to monitor the MSD system performance. Experience on *LeConte* has shown that occasional seawater injection into the influent retention tank V1 still becomes necessary even with the double bookcells. Such seawater injection can be ensured in a timely manner with a salinometer and to avoid possible discharge of effluent with higher levels of fecal coliform bacteria.

8. EQUIPMENT REMOVAL ROUTE

The new installation will comprise of replacing the existing single (12MX) bookcells and control panels with new double (15MXMP) bookcells and new control panels, while retaining the existing skids, macerators, transfer and overboard discharge pumps. A new De-Clor system will be added to the Omnipure MSD system as indicated in Appendix M. Removal and replacement of the bookcells, control panels or installation of the new De-Clor system can be accomplished without any major structural removals in the vessel. Dismantled equipment can be removed via the existing staircases and doorways. The new equipment can be brought into the MSD room in a similar manner without making new openings in the bulkheads or decks. Equipment from the MSD room (Hold Deck) can be removed via the staircase to the Second Deck and from the Second Deck to the Main Deck (Vehicle Deck) through Fire Safety Door (FSD) #4. From the Main deck, the equipment may be trucked away as required.



Photo 8-1 : Staircase from MSD Room (Hold Deck)
To Second Deck Crew Quarters

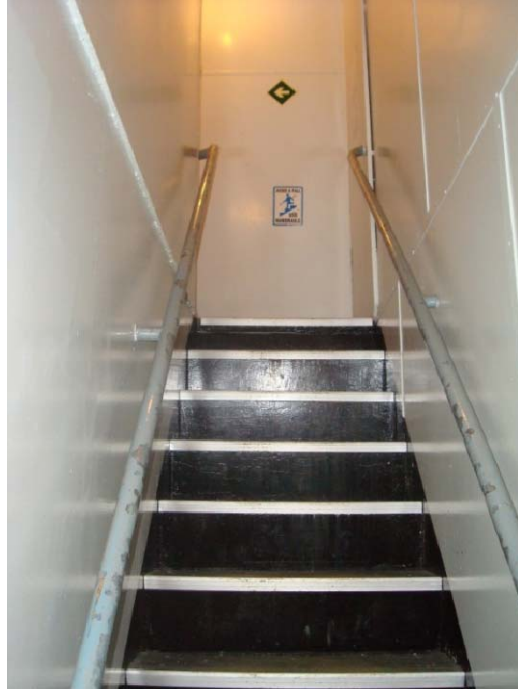


Photo 8-2 :From Second Deck Crew Quarters
To Main Deck (Vehicle Deck)



Photo 8-3 : Fire Safety Door #4 leading to open Main Deck
(Viewed from Vehicle Deck)

9. CONCLUSIONS AND RECOMMENDATIONS

- 9.1 Operation of Omnipure 15MX MSD system in compliance with the manufacturer's factory settings is considered important to maintain the system design output parameters and USCG certification of the unit. The present methodology of ship staff altering the unit settings to meet the ADEC requirements is unsatisfactory and not recommended. It is recommended that solutions to specific system problems are developed and implemented in consultation with the equipment manufacturers to maintain the USCG certification of the MSD system.
- 9.2 The currently installed Omnipure MX15 MSD system in its present state cannot meet the regulatory requirements of consistently maintaining effluent standards nor is it capable of satisfactory sustained operations during the vessel passage through low salinity areas, especially during summer. Upgrading of the system is considered an absolute necessity. It is recommended that the system be upgraded with double bookcells (model #15MXMP) with its associated control panels, a step forward in complying with ADEC regulatory standards.
- 9.3 The collection tanks (V1 and V3) level control panels in their current mode of settings and operation do not provide optimum efficiency of the system with at sea / in port operational features. The option is considered necessary during the vessel's stay in port, when no effluent discharge is permitted. Installation of a Lead/Lag Level Control panel would enable system operation to meet this requirement and comply with the approved BMP Plan guidelines.
- 9.4 A new Salinometer may be installed in the Engine Control Room or in a suitable location to forewarn the crew on watch of the need to monitor the MSD system and take necessary corrective actions including injection of additional seawater into the retention tanks when salinity levels comedown to 7 ppt and below.
- 9.5 The Omnipure 15MXMP MSD system is not designed to control, on its own, residual chlorine levels in the effluent. Hence the unit cannot meet the ADEC requirements of maintaining effluent residual chlorine levels without external or additional means. The upgraded Omnipure 15MXMP unit coupled with an automatic De-Clor system will adequately ensure compliance to the regulatory limits of residual chlorine in the effluent.
- 9.6 The current method of experienced crew training the new personnel is not considered adequate as each experienced crew follows a philosophy of his or her own. Such training lacks consistency and any advancements in the field that take place as a matter of routine. With inadequate technical documentation onboard at this stage, formal training on the upgraded system by qualified/company certified technical personnel is considered necessary for a better appreciation of the need to maintain factory settings on the MSD and to understand methodology to control residual chlorine in the effluent. Onboard training provides a great opportunity for the ship staff to interact with the equipment suppliers and resolve issues not covered in the technical and training manuals.
- 9.7 As part of routine maintenance, periodic system checks and fine tuning by the factory trained technicians will greatly enhance the MSD system performance onboard and provide a quick communication link of any new areas of concern that may arise from time

to time. While six-monthly (biannual) routine checks by the factory trained technicians are desirable, AMHS may opt to choose a well suited frequency to achieve the same goal.

- 9.8 In a communication to the Harbor Marine Group (Appendix J), the ADEC has confirmed that residual chlorine levels in the effluent are to be maintained at 5 ppm and below and not total chlorine as indicated in the BPM Plan. It is recommended that AMHS convey this change in the BMP Plan directive to all concerned vessels.
- 9.9 As the vessel is required to maintain very high quality of effluent standards while transiting through 'designated' areas of the Alaska, Canadian and Washington State waters, and as the Omnipure 15MX MSD cannot meet these extraordinary quality standards, effluent discharge should be forbidden during the vessel passage through such 'designated' areas of these two waters.

10. COST

The rough order of magnitude (ROM) cost of equipment, including installation, is as follows:

Six (6) double bookcells (#15MXMP), Three (3) control panels, three (3) Ultrasonic Flow meters with display, including piping, valves etc.	\$236,064.00
One (1) De-Clor System comprising of two (2) injection pumps and one (1) Controller	\$18,589.00
One (1) Lead/Lag Level Control panel	\$11,040.00
Removal of the old system and Installation of the new units including miscellaneous fittings and testing of the units by Severn Trent De Nora team	\$22,770.00
Training including supply of posters for the MSD Room	\$3,570.00
Salinometer and installation	\$2,000.00
Travel Estimate (will vary based on location)	\$10,000.00
Freight Estimate (will vary based on location)	\$5,000.00

(The above quotation assumes that all labor is supplied by Alfa Tec and is not expected to require significant shipyard labor or support.)

(Alfa Tec quotation dated February 14, 2008 is included as Appendix P)

<u>Approx Total Cost</u>	<u>\$309,033.00</u>
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Period Checks by Alfa-Tec on six-monthly (bi-annual), incl travel	\$2,500.00 ea
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11. LEAD TIME FOR SUPPLY OF EQUIPMENT

The current lead time for supply of the above equipment is a minimum of 12 weeks from the time of issuing a formal purchase order.

Appendix A

Omnipure 15MX Marine Sanitation Device Schematic Arrangement



Appendix B

**Severn Trent De Nora Team
Inspection Report – March 21 and 22 2006**

**Omnipure MSD inspection and machinery reliability interviews Alaska
Marine Highways Ferries, March 21 and 22, 2006
MV Malaspina**

In company with Kevin Oakley of AlfaTec and Paul Johnson, port engineer for Alaska Marine Highways, we visited the MV Malaspina on March 22, 2006 while the vessel was in drydock at Alaska Ship and Drydock in Ketchikan Alaska, in order to inspect the installed Omnipure marine sanitation devices and interview the ship's personnel involved in operating the machines.

The following are our findings :

Personnel interviewed :

Ray Justice, Chief Engineer
Rusty Moises, Junior Engineer

MV Malaspina _ 3 ea. 15 MX units

Total Personnel, crew and passengers - 566

Tank sizes by actual measurement

V-1 -	124"X88"X144"	1,571,328 Cu. in.	6,802 Gal.
V-2 -	72"X74"X127"	676,656 Cu. in.	2,929 Gal.
Aft lift station or V-3 -	73"X81"X 74"	437,562 Cu. in.	1,894 Gal.

The after lift station pumps down to the V-1 tank when the level reaches 75%

The transfer pump shuts down when the tank level reaches 12 %

There is a high level alarm which sounds in the control room when the level reaches 90%.

Findings :

- The discharge sampling points are on the individual overboard pumps.
- There is a new $\frac{1}{4}$ " sampling port installed on the overboard line.
- The individual cells are cleaned by removing the plates and soaking them in Muriatic acid every 75 hours. We inspected #3 cells and found that there was no silicon sealing compound used when the cells were reinstalled. The plate securing

screws were nylon instead of the factory Teflon screws. All of the plates appear to be worn out.

- There is an after holding tank, (aft lift station), installed on the vessel. The volume of this tank is 1,894 Gal. It serves as a collection tank for black and gray water for half of the ship and is pumped down to the V-1 tank
- The machines are run in "override" when brackish water conditions cause a high cell voltage shutdown.
- There is a chlorine injection system piped to inject chlorine into the V-2 tank. They use 12.5% liquid chlorine in a 30 gallon tank. Daily residual chlorine samples are taken at the overboard pump discharge sampling ports. The injection system is not used when the vessel is in salt water. They travel the same route as the MV Columbia and run in "override" appx. 15 % of the time during the summer months.
- The individual overboard pump sampling ports are dirty and covered with verdigris.
- We attempted to open #2 cells but could not drain them down even though the valves were closed.

Recommendations :

- Replace all of the plates on all three machines using silicone to seal the plates in the cell bodies. Use the factory recommended Teflon plate screws when rebuilding the cells.
- Inspect all of the orifice plates and replace with factory specified titanium plates.
- Check all valves on all 3 machines for leakage, replace as needed.
- Inspect grounding targets for full function.
- Recalibrate volt and amp meters on all panels.
- Clean the plates in place every 75 hours with a soft brush and dilute solution of Muriatic acid (31.45 %). Hard deposits should be removed with a plastic scraper. Do not remove the plates for cleaning.
- investigate the possibility of setting the level controls on the after lift station tank and the V-1 tank to enable the operator to select a lower tank level than the present normal run settings in order to pump both of these tanks down as far as possible before entering port or before entering brackish water. The intention being to use these two tanks as holding tanks while the vessels are in port or in brackish water to minimize overboard discharge. All of the machines would be run to pump the V-1 and aft lift station tanks to the lowest possible levels prior to entering port or operating in brackish water. As soon as the vessel clears the brackish water or leaves port, the pump start levels for the

after lift station and V-1 tanks would be returned to their normal settings and all of the machines would be run until the V-1 and aft lift station tanks are cycling normally.

- Install an effluent sampling point on the common discharge line. The port should be schedule 80 PVC and should be at least $\frac{1}{2}$ " IPS. The current sampling lines on the overboard pump discharges should be only used for residual chlorine sampling for troubleshooting
- Install influent sampling points on the macerator discharge elbows before the recirculation line to the V-1 tank. These sampling points will be used for future sampling of influent prior to processing. Inspect grounding targets for full function.
- Recalibrate volt and amp meters on all panels.
- Replace the present book cells, control panels and associated piping with low salinity equipment the same as installed on the LeConte.

Omnipure/AlfaTec Work :

- Provide quotations for all spare parts listed above.
- Provide quotations for installation service for the above listed materials.
- Provide crew training including visual aids for the Omnipure equipment.
- Provide maintenance instruction signs for all maintenance functions.
- Provide new maintenance manuals and spare parts lists.
- Provide corrected drawings of the MSD systems as installed.
- Review the shipboard parts inventory and make recommendations for minimum/maximum levels.

Appendix C

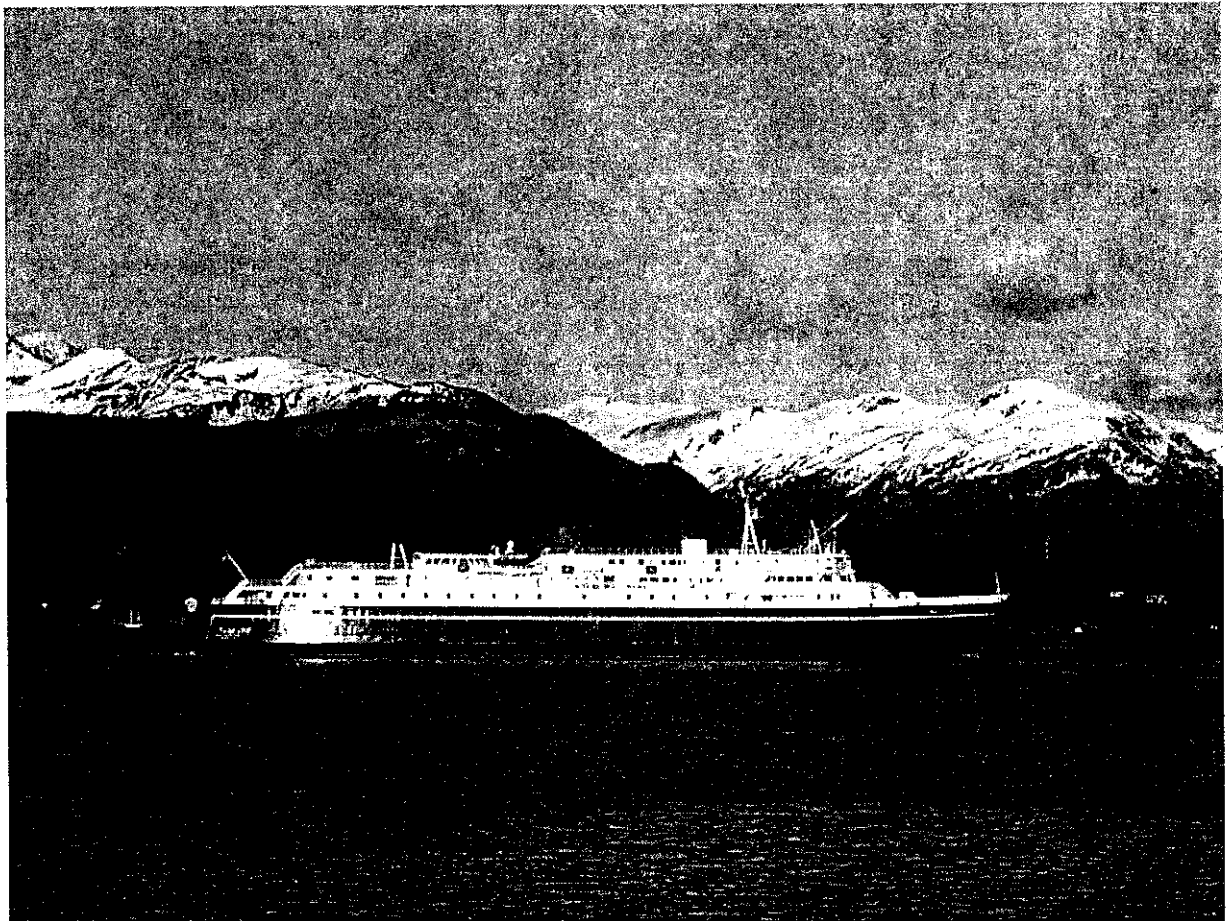
Glosten Associates Fleet Condition Survey
September 2006

Fleet Condition Survey 2006 - Final Submittal

Volume 5: *M/V Malaspina*

Prepared for
Alaska Marine Highway System
Ketchikan, Alaska

Project No. 73002/NH-9500(101)
File No. 05109
13 September 2006



8.5 Sewage Collection and Treatment Systems

75 8.5.1 SEWAGE COLLECTION

The plumbing drains system is a collection of piping from various modification and overhaul periods throughout the life of the vessel. The original steel piping was installed in the 1972 lengthening, and is in fair to poor condition. There are sections of 90:10 Cu-Ni piping from the Boat Deck refurbishment in 1992. The newer sections
80 extend down to the Main Deck, and are in excellent condition.

8.5.2 SEWAGE TREATMENT

The vessel has three Omnipure 15MX MSD units that were installed in 1989. The original sewage tanks and related piping were replaced with three stainless steel sewage tanks. The MSDs are USCG certified, and allow the vessel to discharge
85 treated sewage in coastal waters.

The MSDs treat both gray and black water, but provide primary sewage treatment only. The treatment process consists of three parts: maceration, chlorination and dilution. An electrocatalytic process is used to make chlorine from seawater for treating the sewage. The MSDs have operation problems in both the maceration and
90 chlorination stages of treatment.

The sewage system operates as designed, but requires a high level of maintenance. The book cells and macerator pumps are serviced regularly by the crew, who report relatively few MSD system breakdowns for this vessel. Passenger/crew initiated events (flushing foreign material down the WCs) constitute the majority of the
95 problems with the MSDs.

The three macerator pumps were replaced in 1998 with Scott pumps. The Scott pumps invalidated the USCG approval of the system. The macerator on unit #1 was corrected in summer 2000. At the time of this survey (February 2006), the other two pumps had been replaced with certified pumps, and no further action is necessary.

100 The vessel is often not able to generate adequate chlorine with the book cells, due to the brackish water in areas of operation. As a result, the crew must inject additional chlorine into the system. The handling of concentrated chlorine is dangerous, and it would be best if it could be avoided. Unfortunately, this is not possible with the current system. Alternative methods of treatment are being tested on other vessels in
105 the fleet and the *Malaspina* could benefit from this in the future.

The sewage vent blower in the top of the fidley and associated piping appears to be in good condition.

Fleet Condition Survey — Open Database Item

Vessel		Date	1/17/2006
Deck or System		FCSI No.	4423
Compartment or SubSystem		Compartment No	
SubHeading or Component			
Description			
Omnipure Model 15MX Waste Water Treatment Marine Sanitation Devices. The sewage vent blower in the top of the fidley and associated piping appears to be in good condition but fan is very loud (could be normal). Chlorine aftertreatment is used due to area of brackish water. C/E says chlorine is injected into sanitary flushing line (may help pretreat effluent).			
Recommendation			
Replace the MSD with an advanced system, by 2012.			
Priority	1...Immediate Concern, and/or Regulatory Required 2...Complete within 1 to 5 years 3...Items that can wait 5 years or more	Regulatory Required ☒	1/1/2012
Notes			
In 1989, the original sewage system was replaced with three Omnipure Model 15MX Waste Water Treatment Marine Sanitation Devices. The original sewage tanks and related piping were renewed with three stainless steel sewage tanks. The book cells and macerator pumps are serviced regularly by the crew, who report relatively few MSD system breakdowns for this vessel. The sewage vent blower in the top of the fidley and associated piping appears to be in good condition but fan is very loud (could be normal). Chief engineer and 1st engineer report that MSD is within spec and works well if book cells are kept in good condition. Chlorine aftertreatment is used due to area of brackish water. Chief engineer says chlorine is injected into sanitary flushing line (may help pretreat effluent).			
AMOS No.	Surveyor The Glosten Associates		

Appendix D

**Shipcheck by Severn Trent De Nora
(Alfa Tec, Inc)
January 16 thru 18, 2008**

SERVICE REPORT

February 1st, 2008

To: Ravi Shanker
Foss

Subject: M/V Malaspina-
Omnipure MSD and machinery inspection



ALFA TEC INC.
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On January 16 and 17 I rode the M/V Malaspina from Ketchikan, Alaska to Bellingham, Washington in order to inspect the installed marine sanitation device and machinery. All 3 machines were in service.

The following are my findings:

MSD #1

Model- 15mx
S/N- 89-15mx-127
Feed orifice- 7/16" inch dia.
Return orifice- 1/2" inch dia.
Flow rate- 18gpm
Amps- 52
Volts- 160

MSD #2

Model- 15mx
S/N- 89-15mx-128
Feed orifice- 1/2" inch dia
Return orifice- 1/2" inch dia.
Flow rate- 20gpm
Amps- 48
Volts- 158

MSD #3

Model- 15mx
S/N- 89-15mx-126
Feed orifice- 1/2" inch dia.
Return orifice- 1/2" inch dia
Flow rate- 20gpm
Amps- 46
Volts- 150

* Flow rate, amps and voltage were observed during normal operation on all 3 machines.

- Each unit was equipped with a sample valve on the recirculation line.
- Each machine had previously been installed with an eductor for a brine option located on the seawater line. The brine option has been taken out of service and the ports were fitted with a vacuum gauge.
- There is a vent line on each machine coming off the inlet of the macerator pump and returning to the V1 tank. Each line is equipped with a manual pvc ball valve in the closed position.
- There were sample valves located on each overboard pump as well as the 2" overboard pipe.
- There is a chlorine injection system used to inject chlorine into the V2 tank.
- I took two chlorine samples 30 minutes apart and another 2 hours later from the sample valve located on the 2" overboard line. I found there to be an average of 16mg/l of chlorine present.
- All valves were located in the normal operating position.
- All flow rates were taken prior to the bookcells.
- There was a manometer located on each positive vent. Only one was in service.
- Bookcells are opened and cleaned every 75 hours.

Recommendations:

- Remove eductors and make sure 10gpm dose valves are supplied in the seawater line.
- Remove existing vent line coming off inlet to macerator pump.
- Replace and/or put into service each manometer on positive vent lines.
- Replace any and all metal pipe fittings with schedule 80 pvc.
- Replace the present bookcells, control panels and associated piping with low salinity equipment.



Rick Spainhower
Service Technician
Alfa Tec Inc.

Appendix E

USCG 33CFR159.5

Coast Guard, DHS

§ 159.7

Sewage means human body wastes and the wastes from toilets and other receptacles intended to receive or retain body waste.

Territorial seas means the belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of 3 miles.

Type I marine sanitation device means a device that, under the test conditions described in §§159.123 and 159.125, produces an effluent having a fecal coliform bacteria count not greater than 1,000 per 100 milliliters and no visible floating solids.

Type II marine sanitation device means a device that, under the test conditions described in §§159.126 and 159.126a, produces an effluent having a fecal coliform bacteria count not greater than 200 per 100 milliliters and suspended solids not greater than 150 milligrams per liter.

Type III marine sanitation device means a device that is designed to prevent the overboard discharge of treated or untreated sewage or any waste derived from sewage.

Uninspected vessel means any vessel that is not required to be inspected under 46 CFR Chapter I.

United States includes the States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Canal Zone, and the Trust Territory of the Pacific Islands.

Vessel includes every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on the waters of the United States.

[CGD 96-026, 61 FR 33668, June 28, 1996, as amended by CGD 95-028, 62 FR 51194, Sept. 30, 1997]

§ 159.4 Incorporation by reference.

(a) Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in paragraph (b) of this section, the Coast Guard must publish notice of change in the

FEDERAL REGISTER; and the material must be available to the public. All approved material is available for inspection at the Engineering Division, U.S. Coast Guard Marine Safety Center, 400 Seventh Street, SW., Washington, DC 20590, and at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. All approved material is available from the sources indicated in paragraph (b) of this section.

(b) The material approved for incorporation by reference in this part, and the sections affected, are as follows:

American Society for Testing and Materials (ASTM)

100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 11-95, Standard Specification for Wire Cloth and Sieves for Testing Purposes—159.125

[USCG-1999-5151, 64 FR 67176, Dec. 1, 1999, as amended by USCG-2001-9286, 66 FR 33641, June 25, 2001; 69 FR 18803, Apr. 9, 2004]

§ 159.5 Requirements for vessel manufacturers.

No manufacturer may manufacture for sale, sell, offer for sale, or distribute for sale or resale any vessel equipped with installed toilet facilities unless it is equipped with:

(a) An operable Type II or III device that has a label on it under §159.16 or that is certified under §159.12 or §159.12a; or

(b) An operable Type I device that has a label on it under §159.16 or that is certified under §159.12, if the vessel is 19.7 meters (65 feet) or less in length.

[CGD 95-028, 62 FR 51194, Sept. 30, 1997]

§ 159.7 Requirements for vessel operators.

(a) No person may operate any vessel equipped with installed toilet facilities unless it is equipped with:

(1) An operable Type II or III device that has a label on it under §159.16 or that is certified under §159.12 or §159.12a; or

(2) An operable Type I device that has a label on it under §159.16 or that is

§ 159.11

33 CFR Ch. I (7–1–07 Edition)

certified under § 159.12, if the vessel is 19.7 meters (65 feet) or less in length.

(b) When operating a vessel on a body of water where the discharge of treated or untreated sewage is prohibited by the Environmental Protection Agency under 40 CFR 140.3 or 140.4, the operator must secure each Type I or Type II device in a manner which prevents discharge of treated or untreated sewage. Acceptable methods of securing the device include—

- (1) Closing the seacock and removing the handle;
- (2) Padlocking the seacock in the closed position;
- (3) Using a non-releasable wire-tie to hold the seacock in the closed position; or
- (4) Locking the door to the space enclosing the toilets with a padlock or door handle key lock.

(c) When operating a vessel on a body of water where the discharge of untreated sewage is prohibited by the Environmental Protection Agency under 40 CFR 140.3, the operator must secure each Type III device in a manner which prevents discharge of sewage. Acceptable methods of securing the device include—

- (1) Closing each valve leading to an overboard discharge and removing the handle;
- (2) Padlocking each valve leading to an overboard discharge in the closed position; or
- (3) Using a non-releasable wire-tie to hold each valve leading to an overboard discharge in the closed position.

[CGH 95–028, 62 FR 51194, Sept. 30, 1997]

Subpart B—Certification Procedures

§ 159.11 Purpose.

This subpart prescribes procedures for certification of marine sanitation devices and authorization for labels on certified devices.

§ 159.12 Regulations for certification of existing devices.

(a) The purpose of this section is to provide regulations for certification of existing devices until manufacturers can design and manufacture devices that comply with this part and recog-

nized facilities are prepared to perform the testing required by this part.

(b) Any Type III device that was installed on an existing vessel before January 30, 1975, is considered certified.

(c) Any person may apply to the Commanding Officer, USCG Marine Safety Center, 400 Seventh Street, SW., Washington, DC 20590 for certification of a marine sanitation device manufactured before January 30, 1976. The Coast Guard will issue a letter certifying the device if the applicant shows that the device meets § 159.53 by:

- (1) Evidence that the device meets State standards at least equal to the standards in § 159.53, or
- (2) Test conducted under this part by a recognized laboratory, or
- (3) Evidence that the device is substantially equivalent to a device certified under this section, or
- (4) A Coast Guard field test if considered necessary by the Coast Guard.

(d) The Coast Guard will maintain and make available a list that identifies each device certified under this section.

(e) Devices certified under this section in compliance with § 159.53 need not meet the other regulations in this part and may not be labeled under § 159.16.

[CGD 73–83, 40 FR 4624, Jan. 30, 1975, as amended by CGD 75–213, 41 FR 15325, Apr. 12, 1976; CGD 82–063a, 48 FR 4776, Feb. 3, 1983; CGD 88–052, 53 FR 25122, July 1, 1988; CGD 96–026, 61 FR 33668, June 28, 1996; USCG–2001–9286, 66 FR 33641, June 25, 2001]

§ 159.12a Certification of certain Type III devices.

(a) The purpose of this section is to provide regulations for certification of certain Type III devices.

(b) Any Type III device is considered certified under this section if:

- (1) It is used solely for the storage of sewage and flushwater at ambient air pressure and temperature; and
 - (2) It is in compliance with § 159.53(c).
- (c) Any device certified under this section need not comply with the other regulations in this part except as required in paragraphs (b)(2) and (d) of this section and may not be labeled under § 159.16.

Appendix F

Alaska Statute 46.03.462 and 463

AS 46.03.462. Terms and Conditions of Discharges.

(a) An owner or operator required to register under AS [46.03.461](#) shall comply with the standard terms and conditions of vessel discharges specified in (b) of this section, the alternative terms and conditions of vessel discharges specified in (c) of this section, or the alternative terms and conditions included in the plan approved by the department under (e) of this section.

(b) The standard terms and conditions of vessel discharges are that the owner or operator

(1) may not discharge untreated sewage, treated sewage, graywater, or other wastewater in a manner that violates AS [46.03.463](#) ;

(2) shall maintain records and provide the reports required under AS [46.03.465](#)(a);

(3) shall collect and test samples as required under AS [46.03.465](#) (b) and (d) and provide the reports with respect to those samples required by AS [46.03.475](#) (c);

(4) shall report discharges in accordance with AS [46.03.475](#) (a);

(5) shall allow the department access to the vessel at the time samples are taken under AS [46.03.465](#) for purposes of taking the samples or for purposes of verifying the integrity of the sampling process; and

(6) shall submit records, notices, and reports to the department in accordance with AS [46.03.475](#) (b), (d), and (e).

(c) The department may establish alternative terms and conditions of vessel discharges applicable to an owner or operator of a vessel who cannot practicably comply with the standard terms and conditions of vessel discharges under (b) of this section, or who wishes to use or test alternative environmental protection equipment or procedures. Except as specified in alternative terms and conditions set by the department under this subsection, the alternative terms and conditions of vessel discharges must require compliance with the standard terms and conditions of vessel discharges under (b) of this section. The department, on a case-by-case basis, may set alternative terms and conditions of vessel discharges if

(1) the vessel owner or operator demonstrates to the department's reasonable satisfaction that equivalent environmental protection can be attained through other terms or conditions appropriate for the specific configuration or operation of the vessel;

(2) the vessel owner or operator agrees to make necessary changes to the vessel to allow it to comply with the standard terms and conditions of vessel discharges under (b) of this section but demonstrates to the department's reasonable satisfaction that additional time is needed to make the necessary changes; or

(3) an experimental technology or method for pollution control of a discharge is being used or is proposed as one of the alternative terms and conditions of vessel discharges and the department determines that the experimental technology or method has a reasonable likelihood of success in providing increased protection for the environment.

(d) Alternative terms and conditions of vessel discharges approved by the department under (c) of this section may, if determined appropriate by the department, include a waiver by the department of portions of the requirements of AS [46.03.463](#) and [46.03.465](#), for the time period that the department determines to be appropriate. Alternative terms and conditions of vessel discharges approved by the department under (e) of this section may, if determined appropriate by the department, include a waiver by the department of portions of the requirements of AS [46.03.463](#) for the time period for which the plan submitted under (e) of this section is approved.

(e) The owner or operator of a small commercial passenger vessel may submit a plan for alternative terms and conditions of vessel discharges if the keel of the vessel was laid before

January 1, 2004. Except as provided in (f) of this section, the department shall approve the plan for a three-year period if the department finds that the alternative terms and conditions in the plan incorporate the best management practices for protecting the environment to the maximum extent feasible. The department shall adopt regulations to implement this subsection but may not require an owner or operator to retrofit a vessel solely for the purpose of waste treatment if the retrofitting requires additional stability testing or relicensing by the United States Coast Guard. In this subsection, "best management practices" means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of the marine waters of the state.

(f) A plan submitted under (e) of this section after December 31, 2012, may not be approved by the department for a period extending beyond December 31, 2015.

AS 46.03.463. Prohibited Discharges; Limitations On Discharges.

(a) Except as provided in (h) of this section, a person may not discharge untreated sewage from a commercial passenger vessel into the marine waters of the state.

(b) Except as provided in (h) of this section or under AS [46.03.462](#) (c) - (e), a person may not discharge sewage from a commercial passenger vessel into the marine waters of the state that has suspended solids greater than 150 milligrams per liter or a fecal coliform count greater than 200 colonies per 100 milliliters except that the department may by regulation adopt a protocol for retesting for fecal coliform, if this discharge limit for fecal coliform is exceeded, under which a discharger will be considered to be in compliance with the fecal coliform limit if the geometric mean of fecal coliform count in the samples considered under the protocol does not exceed 200 colonies per 100 milliliters. Upon submission by the owner or operator of a small commercial passenger vessel of a plan for interim protective measures under AS [46.03.462](#) (c)(2) and (d), the department shall extend the time for compliance of that vessel with this subsection.

(c) Except as provided in (h) of this section or under AS [46.03.462](#) (c) - (e), a person may not discharge graywater or other wastewater from a commercial passenger vessel into the marine waters of the state that has suspended solids greater than 150 milligrams per liter or a fecal coliform count greater than 200 colonies per 100 milliliters except that the department may by regulation adopt a protocol for retesting for fecal coliform, if this discharge limit for fecal coliform is exceeded, under which a discharger will be considered to be in compliance with the fecal coliform limit if the geometric mean of fecal coliform count in the samples considered under the protocol does not exceed 200 colonies per 100 milliliters. Upon submission by the owner or operator of a large commercial passenger vessel of a plan for interim protective measures, the department shall extend the time for compliance of that vessel with this subsection for a period of time that ends not later than January 1, 2003. Upon submission by the owner or operator of a small commercial passenger vessel of a plan for interim protective measures under AS [46.03.462](#) (c)(2) and (d), the department shall extend the time for compliance of that vessel with this subsection.

(d) The department may by regulation establish numeric or narrative standards for other parameters for treated sewage, graywater, and other wastewater discharged from commercial passenger vessels. In developing regulations under this subsection, the department shall consider the best available scientific information on the environmental effects of the regulated discharges, the materials and substances handled on the vessels, vessel movement effects, and the availability of new technologies for wastewater.

(e) Except as provided in (g) and (h) of this section or under AS [46.03.462](#)(c) - (e), a person may not discharge any treated sewage, graywater, or other wastewater from a large commercial passenger vessel into the marine waters of the state unless

(1) the vessel is underway and proceeding at a speed of not less than six knots;

(2) the vessel is at least one nautical mile from the nearest shore, except in areas designated by the department;

(3) the discharge complies with all applicable vessel effluent standards established under the federal cruise ship legislation and any other applicable law; the standards under the federal cruise ship legislation and other applicable law may be adopted by regulation by the department; and

(4) the vessel is not in an area where the discharge of treated sewage, graywater, or other wastewater is prohibited.

(f) Except as provided in (h) of this section, a person may not discharge sewage from a small commercial passenger vessel unless the sewage has been processed through a properly operated and properly maintained marine sanitation device.

(g) The provisions of (e)(1) and (e)(2) of this section do not apply to a discharge permitted under sec. 1404(b) or (c) of the federal cruise ship legislation.

(h) The provisions of (a) - (f) of this section do not apply to discharges made for the purpose of securing the safety of the commercial passenger vessel or saving life at sea if all reasonable precautions have

Appendix G

Historical Data of Effluent Quality – Malaspina 2001 thru 2007

Vessel	Sample Date	Ammonia as N mg/L	pH, units	BOD, mg/L	COD, mg/L	TSS, mg/L	Total Cl, mg/L	Free Cl, mg/L	Fecal Coliforms, MPN/100ml	conductivity umhos/cm	TOC, mg/L	alkalinity, Total as CaCO3, mg/L	Total Nitrate & Nitrite as N, mg/L	Total Phosphorus, mg/L	TKN, mg/L	SS, mg/L
Malaspina	7/2/01	1.400	7.90	20.0	470.0	40.0	0.05	0.05	70,000	34,800						
Malaspina	6/26/02	10.10	7.0	89	876.0	100.0	n/a	4.00	5	28,300	n/a	n/a	n/a	n/a	n/a	n/a
Malaspina	7/9/02	0.12	7.9	1	514.0	22.9	3.50	2.50	1	23,800	6.0	62.3	0.5	0.35	0.8	0.1
Malaspina	9/6/02	8.90	7.2	94	220.0	55.6	0.05	0.00	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Malaspina	8/16/03	72	7.17	344	280	119	0	0	3,000,000	17,200	183	344	0	9.20	84	0
Malaspina	8/14/04	17.7	7.1	329	490	130	0.05	0.05	26,000,000	13,300	107	285	0.05	6	29.4	0.05
Malaspina	9/20/04	20.2	6.8	230	730	145	0.05	0.05	250	28,800	159	148	10		53	2.1
Malaspina	9/20/04	21	6.81	244	1200	120	0.05	0.05	10	28,500	408	153	9.8		52.6	2.3
Malaspina	10/21/04	20.2	6.8	230	730	145	ND	ND	250	28,800	159	148	10	2.8	53	2.1
Malaspina	8/13/05	61.2	7.03	412	1100	111	<.1	<.1	7,700,000	13,300	390	364	<.8	9.9	79.8	0.1
Malaspina	9/21/05		7.22	301		82	<.1	<.1	2,200,000							
Malaspina	10/17/05		7.43	92.8		43.6	0.2	0.1	<2.5							
Malaspina	5/6/06	14.2	7.21	128	726	70.3	19	5.6	<2.0	30,300	66	122	<16	3.2	18.9	<.1



Mr. Mark Perez
Ship Engineer
Alaska Marine Highway System
3132 Channel Drive Room 315
Juneau, AK 99801

May 28, 2007

M/V Malaspina ADEC Compliance Sampling

Date of Collection: May 5, 2007
Sampling Location: Juneau, Alaska
Sampling Team: David Wetzel, Susan Cable

Summary

A scheduled ADEC compliance sample of the overboard discharge from the M/V Malaspina was collected from the overboard sampling port at 15:55 hours on May 5, 2007 for the analysis of conventional pollutants in accordance with the VSSP. The vessel was docked in Juneau and discharging at the time of sampling. The samplers were accompanied by the 1st Engineer for the duration of the sampling event. Samples were taken and field tests were conducted by David Wetzel and Susan Cable of Admiralty Environmental.

The sampling port was flushed by the 1st Engineer prior to sampling. The sample was collected into eight containers: a 1 liter unpreserved polyethylene bottle for the laboratory tests of BOD, Total Suspended Solids, Conductivity, Alkalinity, and pH; a 1 liter unpreserved polyethylene bottle for the laboratory test of Settleable Solids, a 125 ml unpreserved polyethylene bottle for the field tests of Free Residual Chlorine, Total Residual Chlorine, pH, and temperature; a 250 ml polyethylene bottle preserved with sulfuric acid for the laboratory tests of Ammonia, COD, and Total Phosphorus; a 500 ml polyethylene bottle preserved with sulfuric acid for the laboratory test of Total Kjeldahl Nitrogen; a 120 ml amber glass bottle preserved with sulfuric acid for the laboratory test of Total Organic Carbon; a 1 liter amber glass bottle preserved with sulfuric acid for the laboratory test of Oil and Grease; and a sterile 120 ml bottle preserved with sodium thiosulfate for the laboratory test of fecal coliforms. The sample was placed on ice immediately, and the fecal coliform sample was placed into a separate ice bath. All sampling and sample handling procedures were conducted in accordance with the *AMHS 2007 Operating Season Quality Assurance/Quality Control Plan For Sampling and Analysis of Treated Sewage and Graywater From Commercial Passenger Vessels (QA/QCP)*. Samples were delivered to Analytica Alaska, Juneau for analysis and all regulatory holding times were met for all tests.

A complete report of the final lab results is enclosed. The official documentation follows this report, and includes the analytical data, chain of custody forms, cooler receipt forms, field notes, and sampling checklist.

Kindest Regards,

David Wetzel
Admiralty Environmental



Analytica Alaska, Inc. - Juneau
5438 Shaune Drive
Juneau, AK 99801
Phone: 907-780-6668

5/21/2007

Admiralty Environmental, LLC
431 N. Franklin St.
Suite 101
Juneau, AK 99801
Attn: David Wetzel

Work Order #: J0705055
Date: 5/21/2007
Work ID: M/V Malaspina Compliance
Date Received: 5/5/2007

Sample Identification

Lab Sample Number	Client Description	Lab Sample Number	Client Description
J0705055-01	Overboard Discharge		

Enclosed are the analytical results, in summary format, for the submitted sample(s). Please review the CASE NARRATIVE for a discussion of any data and/or quality control issues.

Sincerely,

Robin Jung
Manager

Case Narrative

Analytica Alaska Southeast

Work Order: J0705055

Samples were prepared and analyzed according to EPA or equivalent methods outlined in the following references:

Pfaff, J. D., C. A. Brockhoff and J. W. O'Dell. 1994. The Determination of Inorganic Anions in Water by Ion Chromatography. Method 300.0A. U. S. Environmental Protection Agency. Environmental Monitoring Systems Lab.

Methods for Chemical Analysis of Water and Wastes, USEPA 600/4-79-020, March 1983.

Standard Methods for the Examination of Water and Wastewater, 17th Edition, 1989.

USEPA Method 1664, EPA-821-B-94-004b, N-Hexane Extractable Material (HEM) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM) by Extraction and Gravimetry (Oil and Grease and Total Petroleum Hydrocarbons), April 1995.

SAMPLE RECEIPT:

One (1) sample was received on 5/5/2007 5:00:00 PM at a temperature of 1.1°C in cooler 1 at Analytica-Juneau. The cooler was opened on 5/5/2007. The sample was received in good condition and in order per chain of custody.

The sample was transferred for various analyses to Analytica Environmental Laboratories (AEL); 12189 Pennsylvania St. Thornton, CO 80241 where it was received at a temperature of 4.0°C in good condition and in order per chain of custody on 5/10/2007.

The sample was transferred for TOC analysis to Analytica-Alaska (4307 Arctic Boulevard, Anchorage, Alaska 99503) where it was received at a temperature of 5.5°C. The samples were received in good condition and in order per chain of custody on 5/11/2007.

REVIEW FOR COMPLIANCE WITH ANALYTICA QA PLAN

A summary of our review is shown below.

All analytical results contained in this report have been reviewed under Analytica's internal quality assurance and quality control program. Any deviations in quality control parameters for specific analyses are noted in the following text. A complete quality assurance report, including laboratory control, matrix spike, and sample duplicate recoveries is kept on file in our office and is available upon request.

All method specifications were met for the following tests, unless otherwise noted:

Test Method: 120.1 Specific Conductance - (EC) - Aqueous

Test Method: 150.1 - pH, Electrometric - (pH) - Aqueous

Test Method: 160.2-Residue, Gravimetric, Non-filterable, 105°C - (TSS) - Aqueous

Test Method: 160.5 - Residue, Settleable Matter Volumetric, Imhoff Cone - (SS) - Aqueous

Test Method: 1664 Hexane Extractable Material - TPH w/SGT - Aqueous

Test Method: 350.2 - Ammonia, Titration Method - Ammonia, Dist./Titration - Aqueous

Test Method: 351.3 - Nitrogen, Kjeldahl, Total - TKN by dist/titration - Aqueous

Test Method: 365.2 - Phosphorous by colorimetry - Total Phos - Aqueous

Test Method: 405.1 - Biochemical Oxygen Demand, 5 day - (BOD5) - Aqueous

Test Method: Chemical Oxygen Demand (Colorimetric, Automated; Manual) - COD - Aqueous

Test Method: Inorganic Anions by Ion Chromatography - Nitrate&Nitrite by IC - Aqueous

Test Method: SM 2320B - Alkalinity - Aqueous

Test Method: SM4500-Cl₂, Chlorine by Colorimetric DPD - Total Residual Chlorine - Aqueous

Test Method: SM5310B - TOC - Aqueous

Test Method: SM9222D Fecal Coliform by MF - FC by Memb. Filtration - Aqueous

Summary of Detected Analytes

Analytica Alaska Southeast

Workorder (SDG): **J0705055**
 Project: **M/V Malaspina Compliance**
 Client: **Admiralty Environmental, LLC**
 Client Project Number: **AMHS**

Client Sample Name: **Overboard Discharge**

Matrix: Aqueous

Collection Date: 5/5/2007 3:55:00PM

<u>Analyte</u>	<u>Result</u>	<u>PQL</u>	<u>Units</u>	<u>Analysis Date</u>	<u>Flags</u>	<u>Analyst</u>	<u>Method</u>
Chemical Oxygen Demand	180	24	mg/L	5/18/07 17:38		cseltrech	Chemical Oxygen Demand (Colorimetric, Automated; Manual) - COD
Total Suspended Solids	43.0	4.0	mg/L	5/7/07 13:35		scm	160.2-Residue, Gravimetric, Non-filterable, 105°C - (TSS)
pH	7.33	0.10	pH	5/5/07 19:25		sw	150.1 - pH, Electrometric - (pH)
Conductivity	33.2	2.0	umhos/cm	5/8/07 14:00		scm	120.1 Specific Conductance - (EC)
Total settleable solids	<0.10	0.10	mL/L	5/5/07 19:30		sw	160.5 - Residue, Settleable Matter Volumetric, Imhoff Cone - (SS)
Total Nitrate & Nitrite as N	<32	32	mg/L	5/19/07 13:13		KB	Inorganic Anions by Ion Chromatography - Nitrate&Nitrite by IC
Hexane-Extractable Material	<5.4	5.4	mg/L	5/14/07 11:00		L. Friedm	1664 Hexane Extractable Material - TPH w/SGT
Biochemical O2 Demand, 5 Day	51.3	2.0	mg/L	5/5/07 18:50		rj	405.1 - Biochemical Oxygen Demand, 5 day - (BOD5)
Chlorine, Free	33.2	4.0	mg/L	5/5/07 15:55		dw	SM4500-CIG , Chlorine by Colorimetric DPD - Total Residual Chlorine
Chlorine, Residual	24.8	4.0	mg/L	5/5/07 15:55		dw	SM4500-CIG , Chlorine by Colorimetric DPD - Total Residual Chlorine
Phosphorus, Total and Ortho	1.2	0.26	mg/L	5/15/07 12:32		kstone	365.2 - Phosphorous by colorimetry - Total Phos
Alkalinity, Total as CaCO3	118	2.0	mg/L CaCO3	5/5/07 18:00		bw	SM 2320B - Alkalinity
Fecal Coliform Bacteria by MF	<10	10	CFU/100mL	5/5/07 19:00		bw	SM9222D Fecal Coliform by MF - FC by Memb. Filtration
Total Organic Carbon	30	10	mg/L	5/11/07 21:06		aj	SM5310B - TOC
Nitrogen, Total Kjeldahl	2.86	0.40	mg/L	5/17/07 16:39		kbaca	351.3 - Nitrogen,Kjeldahl, Total - TKN by dist/titration
Ammonia as N	<0.40	0.40	mg/L	5/16/07 16:26		kbaca	350.2 - Ammonia, Titration Method - Ammonia, Dist./Titration

Results with Batch QC
Malaspina
Unannounced
Sampled on 05.05.2007

Detailed Analytical Report

Analytica Alaska Southeast

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Report Section: Client Sample Report

Client Sample Name: **Overboard Discharge**

Matrix: Aqueous

Collection Date: 5/5/2007 3:55:00PM

The following test was conducted by: Analytica - Anchorage

Lab Sample Number: J0705055-01E

Prep Date: 5/11/2007

Analytical Method ID: SM5310B - TOC

Prep Method ID: SM5310B

Prep Batch Number: A070517008

Report Basis: As Received

Sample prep wt./vol: 1.00 ml

Analysis Date: 5/11/2007 9:06:46PM

Instrument: TOC-5000

File Name:

Dilution Factor: 10

Analyst Initials: aj

Prep Extract Vol: 1.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Total Organic Carbon		30		mg/L	10	3.0	1

The following test was conducted by: Analytica - Juneau

Lab Sample Number: J0705055-01A

Prep Date: 5/5/2007

Analytical Method ID: SM 2320B - Alkalinity

Prep Method ID: 2320B

Prep Batch Number: J070509003

Report Basis: As Received

Sample prep wt./vol: 50.00 ml

Analysis Date: 5/5/2007 6:00:00PM

Instrument: Titrametric

File Name:

Dilution Factor: 2

Analyst Initials: bw

Prep Extract Vol: 50.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Alkalinity, Total as CaCO3		118		mg/L CaCO	2.0	0.67	1

The following test was conducted by: Analytica - Juneau

Lab Sample Number: J0705055-01A

Prep Date: 5/5/2007

Analytical Method ID: SM4500-CIG , Chlorine by Colormetric DPD - Total Residual Chlo

Prep Method ID: SM4500CIG

Prep Batch Number: J070521003

Report Basis: As Received

Sample prep wt./vol: 10.00 ml

Analysis Date: 5/5/2007 3:55:00PM

Instrument: Colorimeter

File Name:

Dilution Factor: 40

Analyst Initials: dw

Prep Extract Vol: 10.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Chlorine, Free		40		mg/L	4.0	4.0	1
Chlorine, Residual		44		mg/L	4.0	4.0	

The following test was conducted by: Analytica - Juneau

Lab Sample Number: J0705055-01A

Prep Date: 5/5/2007

Analytical Method ID: 405.1 - Biochemical Oxygen Demand, 5 day - (BOD5)

Prep Method ID: 405.1

Prep Batch Number: J070511001

Report Basis: As Received

Sample prep wt./vol: 300.00 ml

Analysis Date: 5/5/2007 6:50:00PM

Instrument: Probe

File Name:

Dilution Factor: 1

Analyst Initials: tj

Prep Extract Vol: 300.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
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Detailed Analytical Report

Analytica Alaska Southeast

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Report Section: Client Sample Report

Client Sample Name: **Overboard Discharge**

Matrix: Aqueous Collection Date: 5/5/2007 3:55:00PM

Lab Sample Number:	J0705055-01A	Analysis Date:	5/5/2007 6:50:00PM
Prep Date:	5/5/2007	Instrument:	Probe
Analytical Method ID:	405.1 - Biochemical Oxygen Demand, 5 day - (BOD5)	File Name:	
Prep Method ID:	405.1	Dilution Factor:	1
Prep Batch Number:	J070511001		
Report Basis:	As Received	Analyst Initials:	tj
Sample prep wt./vol:	300.00 ml	Prep Extract Vol:	300.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Biochemical O2 Demand, 5 Day		51.3		mg/L	2.0	2.0	1

The following test was conducted by: Analytica - Juneau

Lab Sample Number:	J0705055-01D	Analysis Date:	5/5/2007 7:30:00PM
Prep Date:	5/5/2007	Instrument:	Visual Analyti
Analytical Method ID:	160.5 - Residue, Settleable Matter Volumetric, Imhoff Cone - (SS)	File Name:	
Prep Method ID:	160.5	Dilution Factor:	1
Prep Batch Number:	J070508008		
Report Basis:	As Received	Analyst Initials:	sw
Sample prep wt./vol:	1,000.00 ml	Prep Extract Vol:	1,000.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Total settleable solids		ND		mL/L	0.10	0.10	1

The following test was conducted by: Analytica - Juneau

Lab Sample Number:	J0705055-01A	Analysis Date:	5/8/2007 2:00:00PM
Prep Date:	5/8/2007	Instrument:	Probe
Analytical Method ID:	120.1 Specific Conductance - (EC)	File Name:	
Prep Method ID:	120.1	Dilution Factor:	1
Prep Batch Number:	J070514001		
Report Basis:	As Received	Analyst Initials:	scm
Sample prep wt./vol:	30.00 ml	Prep Extract Vol:	30.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Conductivity		33.2		umhos/cm	2.0	1.0	1

The following test was conducted by: Analytica - Juneau

Lab Sample Number:	J0705055-01A	Analysis Date:	5/5/2007 7:25:00PM
Prep Date:	5/5/2007	Instrument:	Probe
Analytical Method ID:	150.1 - pH, Elecrometric - (pH)	File Name:	
Prep Method ID:	150.1	Dilution Factor:	1
Prep Batch Number:	J070508007		
Report Basis:	As Received	Analyst Initials:	sw
Sample prep wt./vol:	30.00 pH	Prep Extract Vol:	30.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
pH		7.33		pH	0.10	0.10	1

The following test was conducted by: Analytica - Juneau

Detailed Analytical Report

Analytica Alaska Southeast

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Report Section: Client Sample Report

Client Sample Name: **Overboard Discharge**

Matrix: Aqueous Collection Date: 5/5/2007 3:55:00PM

Lab Sample Number:	J0705055-01A	Analysis Date:	5/7/2007 1:35:00PM
Prep Date:	5/7/2007	Instrument:	SCALE
Analytical Method ID:	160.2-Residue, Gravimetric, Non-filterable, 105°C - (TSS)	File Name:	
Prep Method ID:	160.2	Dilution Factor:	1
Prep Batch Number:	J070511002		
Report Basis:	As Received	Analyst Initials:	scm
Sample prep wt./vol:	100.00 ml	Prep Extract Vol:	100.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Total Suspended Solids		43.0		mg/L	4.0	1.3	1

The following test was conducted by: Analytica - Juneau

Lab Sample Number:	J0705055-01C	Analysis Date:	5/5/2007 7:00:00PM
Prep Date:	5/5/2007	Instrument:	Micro
Analytical Method ID:	SM9222D Fecal Coliform by MF - FC by Memb. Filtration	File Name:	
Prep Method ID:	SM9222D	Dilution Factor:	1
Prep Batch Number:	J070514021		
Report Basis:	As Received	Analyst Initials:	bw
Sample prep wt./vol:	10.00 ml	Prep Extract Vol:	100.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Fecal Coliform Bacteria by MF		ND		CFU/100m	10	10	1

The following test was conducted by: Analytica - Thornton

Lab Sample Number:	J0705055-01B	Analysis Date:	5/14/2007 11:00:00AM
Prep Date:	5/14/2007	Instrument:	SCALE
Analytical Method ID:	1664 Hexane Extractable Material - TPH w/SGT	File Name:	
Prep Method ID:	1664_WG	Dilution Factor:	1
Prep Batch Number:	T070515020		
Report Basis:	As Received	Analyst Initials:	L. Friedman/ R. Seeman
Sample prep wt./vol:	930.00 ml	Prep Extract Vol:	1.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Hexane-Extractable Material	na	ND		mg/L	5.4	1.6	1

The following test was conducted by: Analytica - Thornton

Lab Sample Number:	J0705055-01F	Analysis Date:	5/16/2007 4:26:00PM
Prep Date:	5/16/2007	Instrument:	Bubbles K370
Analytical Method ID:	350.2 - Ammonia, Titration Method - Ammonia, Dist./Titrat	File Name:	
Prep Method ID:	4500NH3E	Dilution Factor:	1
Prep Batch Number:	T070516004		
Report Basis:	As Received	Analyst Initials:	kbaca
Sample prep wt./vol:	100.00 ml	Prep Extract Vol:	100.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Ammonia as N	7664-41-7	ND		mg/L	0.40	0.11	1

The following test was conducted by: Analytica - Thornton

Detailed Analytical Report

Analytica Alaska Southeast

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Report Section: Client Sample Report

Client Sample Name: **Overboard Discharge**

Matrix: Aqueous Collection Date: 5/5/2007 3:55:00PM

Lab Sample Number: J0705055-01F Analysis Date: 5/17/2007 4:39:56PM
Prep Date: 5/17/2007 Instrument: Bubbles K370
Analytical Method ID: 351.3 - Nitrogen, Kjeldahl, Total - TKN by dist/titration File Name:
Prep Method ID: 351.3_w Dilution Factor: 1
Prep Batch Number: T070517001
Report Basis: As Received Analyst Initials: kbaca
Sample prep wt./vol: 100.00 ml Prep Extract Vol: 100.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Nitrogen, Total Kjeldahl		2.86		mg/L	0.40	0.11	1

The following test was conducted by: Analytica - Thornton

Lab Sample Number: J0705055-01F Analysis Date: 5/15/2007 12:32:00PM
Prep Date: 5/15/2007 Instrument: Hach 2500 Col
Analytical Method ID: 365.2 - Phosphorous by colorimetry - Total Phos File Name:
Prep Method ID: TotPWmeth Dilution Factor: 1
Prep Batch Number: T070515019
Report Basis: As Received Analyst Initials: kstone
Sample prep wt./vol: 2.00 ml Prep Extract Vol: 10.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Phosphorus, Total and Ortho		1.2		mg/L	0.26	0.13	1

The following test was conducted by: Analytica - Thornton

Lab Sample Number: J0705055-01F Analysis Date: 5/19/2007 1:13:04PM
Prep Date: 5/14/2007 Instrument: IC
Analytical Method ID: Inorganic Anions by Ion Chromatography - Nitrate&Nitrite by IC File Name: 70518A_005.D
Prep Method ID: 300.0 Dilution Factor: 40
Prep Batch Number: T070516005
Report Basis: As Received Analyst Initials: KB
Sample prep wt./vol: 20.00 ml Prep Extract Vol: 20.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Total Nitrate & Nitrite as N		ND		mg/L	32	1.6	7

The following test was conducted by: Analytica - Thornton

Lab Sample Number: J0705055-01F Analysis Date: 5/18/2007 5:38:46PM
Prep Date: 5/18/2007 Instrument: Hach 2500 Col
Analytical Method ID: Chemical Oxygen Demand (Colorimetric, Automated; Manual) - CO File Name:
Prep Method ID: 410.4M Dilution Factor: 1
Prep Batch Number: T070518017
Report Basis: As Received Analyst Initials: cseltrecht
Sample prep wt./vol: 5.00 ml Prep Extract Vol: 10.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Chemical Oxygen Demand		180		mg/L	24	8.4	1

Detailed Analytical Report

Analytica Alaska Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Report Section: Method Blank Report

Client Sample Name: MB

Matrix: Aqueous

Collection Date: 5/11/2007 12:00:00AM

The following test was conducted by: Analytica - Anchorage

Lab Sample Number: A070517008-MB

Prep Date: 5/11/2007

Analytical Method ID: SM5310B - TOC

Prep Method ID: SM5310B

Prep Batch Number: A070517008

Report Basis: Dry Weight Basis

Sample prep wt./vol: 1.00 ml

Analysis Date: 5/11/2007 9:06:46PM

Instrument: TOC-5000

File Name:

Dilution Factor: 1

Analyst Initials: aj

Prep Extract Vol: 1.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Total Organic Carbon		ND		mg/L	1.0	0.30	1

The following test was conducted by: Analytica - Juneau

Lab Sample Number: J070509003-MB

Prep Date: 5/5/2007

Analytical Method ID: SM 2320B - Alkalinity

Prep Method ID: 2320B

Prep Batch Number: J070509003

Report Basis: Dry Weight Basis

Sample prep wt./vol: 50.00 ml

Analysis Date: 5/5/2007 6:00:00PM

Instrument: Titrametric

File Name:

Dilution Factor: 1

Analyst Initials: bw

Prep Extract Vol: 50.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Alkalinity, Total as CaCO3		ND		mg/L CaCO	1.0	0.34	1

The following test was conducted by: Analytica - Juneau

Lab Sample Number: J070511001-MB

Prep Date: 5/5/2007

Analytical Method ID: 405.1 - Biochemical Oxygen Demand, 5 day - (BOD5)

Prep Method ID: 405.1

Prep Batch Number: J070511001

Report Basis: Dry Weight Basis

Sample prep wt./vol: 300.00 ml

Analysis Date: 5/5/2007 1:30:00PM

Instrument: Probe

File Name:

Dilution Factor: 1

Analyst Initials: tj

Prep Extract Vol: 300.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Biochemical O2 Demand, 5 Day		ND		mg/L	2.0	2.0	1

The following test was conducted by: Analytica - Juneau

Lab Sample Number: J070511002-MB

Prep Date: 5/7/2007

Analytical Method ID: 160.2-Residue, Gravimetric, Non-filterable, 105°C - (TSS)

Prep Method ID: 160.2

Prep Batch Number: J070511002

Report Basis: Dry Weight Basis

Sample prep wt./vol: 100.00 ml

Analysis Date: 5/7/2007 1:35:00PM

Instrument: SCALE

File Name:

Dilution Factor: 1

Analyst Initials: scm

Prep Extract Vol: 100.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Total Suspended Solids		ND		mg/L	4.0	1.3	1

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Report Section: Method Blank Report

Client Sample Name: MB

Matrix: Aqueous

Collection Date: 5/14/2007 11:00:00AM

The following test was conducted by: Analytica - Thornton

Lab Sample Number: T070515020-MB

Prep Date: 5/14/2007

Analytical Method ID: 1664 Hexane Extractable Material - TPH w/SGT

Prep Method ID: 1664_WG

Prep Batch Number: T070515020

Report Basis: Dry Weight Basis

Sample prep wt./vol: 1,000.00 ml

Analysis Date: 5/14/2007 11:00:00AM

Instrument: SCALE

File Name:

Dilution Factor: 1

Analyst Initials: L. Friedman/ R. Seeman

Prep Extract Vol: 1.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Hexane-Extractable Material	na	ND		mg/L	5.0	1.5	1

The following test was conducted by: Analytica - Thornton

Lab Sample Number: T070516004-MB

Prep Date: 5/16/2007

Analytical Method ID: 350.2 - Ammonia, Titration Method - Ammonia, Dist./Titrat

Prep Method ID: 4500NH3E

Prep Batch Number: T070516004

Report Basis: Dry Weight Basis

Sample prep wt./vol: 100.00 ml

Analysis Date: 5/16/2007 4:26:00PM

Instrument: Bubbles K370

File Name:

Dilution Factor: 1

Analyst Initials: kbaca

Prep Extract Vol: 100.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Ammonia as N	7664-41-7	ND		mg/L	0.40	0.11	1

The following test was conducted by: Analytica - Thornton

Lab Sample Number: T070517001-MB

Prep Date: 5/17/2007

Analytical Method ID: 351.3 - Nitrogen,Kjeldahl, Total - TKN by dist/titration

Prep Method ID: 351.3_w

Prep Batch Number: T070517001

Report Basis: Dry Weight Basis

Sample prep wt./vol: 100.00 ml

Analysis Date: 5/17/2007 4:39:56PM

Instrument: Bubbles K370

File Name:

Dilution Factor: 1

Analyst Initials: kbaca

Prep Extract Vol: 100.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Nitrogen, Total Kjeldahl		ND		mg/L	0.40	0.11	1

The following test was conducted by: Analytica - Thornton

Lab Sample Number: T070515019-MB

Prep Date: 5/15/2007

Analytical Method ID: 365.2 - Phosphorous by colorimetry - Total Phos

Prep Method ID: TotPWmeth

Prep Batch Number: T070515019

Report Basis: Dry Weight Basis

Sample prep wt./vol: 10.00 ml

Analysis Date: 5/15/2007 12:32:00PM

Instrument: Hach 2500 Col

File Name:

Dilution Factor: 1

Analyst Initials: kstone

Prep Extract Vol: 10.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Phosphorus, Total and Ortho		ND		mg/L	0.051	0.026	1

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Report Section: Method Blank Report

Client Sample Name: MB

Matrix: Aqueous

Collection Date: 5/14/2007 12:00:00AM

The following test was conducted by: Analytica - Thornton

Lab Sample Number: T070516005-MB

Analysis Date: 5/15/2007 8:02:53PM

Prep Date: 5/14/2007

Instrument: IC

Analytical Method ID: Inorganic Anions by Ion Chromatography - Nitrate&Nitrite by IC

File Name: 070514_056.D

Prep Method ID: 300.0

Dilution Factor: 1

Prep Batch Number: T070516005

Report Basis: Dry Weight Basis

Analyst Initials: KB

Sample prep wt./vol: 20.00 ml

Prep Extract Vol: 20.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Total Nitrate & Nitrite as N		ND		mg/L	0.80	0.039	1

The following test was conducted by: Analytica - Thornton

Lab Sample Number: T070518017-MB

Analysis Date: 5/18/2007 5:38:46PM

Prep Date: 5/18/2007

Instrument: Hach 2500 Col

Analytical Method ID: Chemical Oxygen Demand (Colorimetric, Automated; Manual) - CO

File Name:

Prep Method ID: 410.4M

Dilution Factor: 1

Prep Batch Number: T070518017

Report Basis: Dry Weight Basis

Analyst Initials: cseltrecht

Sample prep wt./vol: 10.00 ml

Prep Extract Vol: 10.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>Rerun #:</u>
Chemical Oxygen Demand		ND		mg/L	12	4.2	1

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Tests Run at: Analytica Environmental Laboratories - Anchorage, Alaska

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Project Number:

Prep Batch: A070517008

QUALITY CONTROL REPORT

LCS/LCSD REPORT

Analysis: SM5310B - TOC

MB: A070517008-MB

Prep Date: 5/11/2007

MB Anal. Date: 5/11/2007 9:06:46PM

Units: mg/L

LCS Anal. Date: 5/11/2007 9:06:46PM LCSD Anal. Date: 5/11/2007 9:06:46PM Matrix: Aqueous

<u>Analyte Name</u>	<u>SampResult</u>	<u>LCSRes.</u>	<u>SDRes.</u>	<u>SPLev</u>	<u>SPDLv</u>	<u>Recov.</u>	<u>SD Recov</u>	<u>RPD</u>	<u>Recov Lim</u>	<u>RPDLim</u>	<u>Flag</u>
Total Organic Carbon	ND	9.33	9.07	10.0	10.0	93.3	90.7	2.8	90 - 110	20	

FOOTNOTES TO QC REPORT

Note 1: Results are shown to three significant figures to avoid rounding errors in calculations.

Note 2: If the sample concentration is greater than 4 times the spike level, a recovery is not meaningful, and the result should be used as a replicate. In such cases the spike is not as high as expected random measurement variability of the sample result itself.

Note 3: For sample duplicates, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample and duplicate results are not five times the PQL or greater, then the RPD is not expected to fall within the window shown and the comparison should be made on the basis of the absolute difference. Analytica uses the criterion that the absolute difference should be less than the PQL for water or less than 2XPQL for other matrices.

Note 4: For serial dilutions, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample result is not 50 times the MDL or greater, then the fact that the RPD does not meet the 10% criterion has little significance. Otherwise it indicates that a matrix bias may exist at the analytical step.

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Tests Run at: Analytica Environmental Laboratories - Juneau, Alaska

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Project Number:

Prep Batch: J070511002

QUALITY CONTROL REPORT

SAMPLE DUPLICATE REPORT

Analysis: 160.2-Residue, Gravimetric, Non-filterable, 105°C - (TSS)

Base Sample: J0705054-05A

Prep Date: 5/7/2007

Samp. Anal. Date: 5/7/2007 1:35:00PM

Units: mg/L

DUP Anal. Date: 5/7/2007 1:35:00PM

Matrix: Aqueous

Analyte Name	SampResult	DUPRes.	RPD	RPDLim	Flag
Total Suspended Solids	990	1,000	1.0	10	

Analysis: 160.2-Residue, Gravimetric, Non-filterable, 105°C - (TSS)

Base Sample: J0705056-01A

Prep Date: 5/7/2007

Samp. Anal. Date: 5/7/2007 1:35:00PM

Units: mg/L

DUP Anal. Date: 5/7/2007 1:35:00PM

Matrix: Aqueous

Analyte Name	SampResult	DUPRes.	RPD	RPDLim	Flag
Total Suspended Solids	43.0	38.0	12.3	10	OUT

LCS/LCSD REPORT

Analysis: 160.2-Residue, Gravimetric, Non-filterable, 105°C - (TSS)

MB: J070511002-MB

Prep Date: 5/7/2007

MB Anal. Date: 5/7/2007 1:35:00PM

Units: mg/L

LCS Anal. Date: 5/7/2007 1:35:00PM LCSD Anal. Date: 5/7/2007 1:35:00PM

Matrix: Aqueous

Analyte Name	SampResult	LCSRes.	SDRes.	SPLev	SPDLim	Recov.	SD Recov	RPD	Recov Lim	RPDLim	Flag
Total Suspended Solids	ND	97.0	93.0	100	100	97.0	93.0	4.2	85 - 115	10	

Prep Batch: J070508007

SAMPLE DUPLICATE REPORT

Analysis: 150.1 - pH, Elecrometric - (pH)

Base Sample: J0705055-01A

Prep Date: 5/5/2007

Samp. Anal. Date: 5/5/2007 7:25:00PM

Units: pH

DUP Anal. Date: 5/5/2007 7:25:00PM

Matrix: Aqueous

Analyte Name	SampResult	DUPRes.	RPD	RPDLim	Flag
pH	7.33	7.36	0.4	20	

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Tests Run at: Analytica Environmental Laboratories - Juneau, Alaska

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Project Number:

Prep Batch: J070508007

QUALITY CONTROL REPORT

Prep Batch: J070514001

SAMPLE DUPLICATE REPORT

Analysis: 120.1 Specific Conductance - (EC)

Base Sample: J0705067-01A
Prep Date: 5/8/2007

Samp. Anal. Date: 5/8/2007 2:00:00PM

Units: umhos/cm

DUP Anal. Date: 5/8/2007 2:00:00PM

Matrix: Aqueous

<u>Analyte Name</u>	<u>SampResult</u>	<u>DUPRes.</u>	<u>RPD</u>	<u>RPDLim</u>	<u>Flag</u>
Conductivity	3,570	3,510	1.7	20	

Analysis: 120.1 Specific Conductance - (EC)

Base Sample: J0705067-07A
Prep Date: 5/8/2007

Samp. Anal. Date: 5/8/2007 2:00:00PM

Units: umhos/cm

DUP Anal. Date: 5/8/2007 2:00:00PM

Matrix: Aqueous

<u>Analyte Name</u>	<u>SampResult</u>	<u>DUPRes.</u>	<u>RPD</u>	<u>RPDLim</u>	<u>Flag</u>
Conductivity	1,870	1,870	0.0	20	

Prep Batch: J070511001

LCS/LCSD REPORT

Analysis: 405.1 - Biochemical Oxygen Demand, 5 day - (BOD5)

MB: J070511001-MB
Prep Date: 5/5/2007

MB Anal. Date: 5/5/2007 1:30:00PM

Units: mg/L

LCS Anal. Date: 5/5/2007 1:15:00PM LCSD Anal. Date: 5/5/2007 1:15:00PM

Matrix: Aqueous

<u>Analyte Name</u>	<u>SampResult</u>	<u>LCSRes.</u>	<u>SDRes.</u>	<u>SPLev</u>	<u>SPDLim</u>	<u>Recov.</u>	<u>SD Recov</u>	<u>RPD</u>	<u>Recov Lim</u>	<u>RPDLim</u>	<u>Flag</u>
Biochemical O2 Demand, 5 DayND		183	180	200	200	91.5	90.0	1.7	75 - 125	20	

Prep Batch: J070509003

LCS/LCSD REPORT

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Tests Run at: Analytica Environmental Laboratories - Juneau, Alaska

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Project Number:

Prep Batch: J070509003

QUALITY CONTROL REPORT

LCS/LCSD REPORT

Analysis: SM 2320B - Alkalinity

MB: J070509003-MB

Prep Date: 5/5/2007

MB Anal. Date: 5/5/2007 6:00:00PM

Units: mg/L CaCO₃

LCS Anal. Date: 5/5/2007 6:00:00PM LCSD Anal. Date: 5/5/2007 6:00:00PM

Matrix: Aqueous

Analyte Name	SampResult	LCSRes.	SDRes.	SPLev	SPDLev	Recov.	SD Recov	RPD	Recov Lim	RPDLim	Flag
Alkalinity, Total as CaCO ₃	ND	60.6	61.2	60.0	60.0	101.0	102.0	1.0	85 - 115	20	

MS/MSD REPORT

Analysis: SM 2320B - Alkalinity

Parent: J0704164-01A

Prep Date: 5/5/2007

Samp. Anal. Date: 5/5/2007 6:00:00PM

Units: mg/L CaCO₃

MS Anal. Date: 5/5/2007 6:00:00PM MSD Anal. Date: 5/5/2007 6:00:00PM

Matrix: Aqueous

Analyte Name	SampResult	MSRes.	MSDRes	SPLev	SPDLev	Recov.	MSD Rec.	RPD	Recov Lim	RPDLim	Flag
Alkalinity, Total as CaCO ₃	107	145	146	40.0	40.0	95.0	97.5	0.7	75 - 125	20	

FOOTNOTES TO QC REPORT

Note 1: Results are shown to three significant figures to avoid rounding errors in calculations.

Note 2: If the sample concentration is greater than 4 times the spike level, a recovery is not meaningful, and the result should be used as a replicate. In such cases the spike is not as high as expected random measurement variability of the sample result itself.

Note 3: For sample duplicates, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample and duplicate results are not five times the PQL or greater, then the RPD is not expected to fall within the window shown and the comparison should be made on the basis of the absolute difference. Analytica uses the criterion that the absolute difference should be less than the PQL for water or less than 2XPQL for other matrices.

Note 4: For serial dilutions, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample result is not 50 times the MDL or greater, then the fact that the RPD does not meet the 10% criterion has little significance. Otherwise it indicates that a matrix bias may exist at the analytical step.

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Tests Run at: Analytica Environmental Laboratories - Thornton, Colorado

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Project Number:

Prep Batch: T070515020

QUALITY CONTROL REPORT

LCS/LCSD REPORT

Analysis: 1664 Hexane Extractable Material - TPH w/SGT

MB: T070515020-MB

Prep Date: 5/14/2007

MB Anal. Date: 5/14/2007 11:00:00AM

Units: mg/L

LCS Anal. Date: 5/14/2007 11:00:00AM LCSD Anal. Date: 5/14/2007 11:00:00AM Matrix: Aqueous

Analyte Name	SampResult	LCSRes.	SDRes.	SPLev	SPDLv	Recov.	SD Recov	RPD	Recov Lim	RPDLim	Flag
Hexane-Extractable Material	ND	13.6	14.1	20.0	20.0	68.0	70.5	3.6	66 - 114	20	

FOOTNOTES TO QC REPORT

Note 1: Results are shown to three significant figures to avoid rounding errors in calculations.

Note 2: If the sample concentration is greater than 4 times the spike level, a recovery is not meaningful, and the result should be used as a replicate. In such cases the spike is not as high as expected random measurement variability of the sample result itself.

Note 3: For sample duplicates, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample and duplicate results are not five times the PQL or greater, then the RPD is not expected to fall within the window shown and the comparison should be made on the basis of the absolute difference. Analytica uses the criterion that the absolute difference should be less than the PQL for water or less than 2XPQL for other matrices.

Note 4: For serial dilutions, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample result is not 50 times the MDL or greater, then the fact that the RPD does not meet the 10% criterion has little significance. Otherwise it indicates that a matrix bias may exist at the analytical step.

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Tests Run at: Analytica Environmental Laboratories - Thornton, Colorado

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Project Number:

Prep Batch: T070518017

QUALITY CONTROL REPORT

SAMPLE DUPLICATE REPORT

Analysis: Chemical Oxygen Demand (Colorimetric, Automated; Manual) - C Base Sample: B0705082-03A
Prep Date: 5/18/2007

Samp. Anal. Date: 5/18/2007 5:38:46PM

Units: mg/L

DUP Anal. Date: 5/18/2007 5:38:46PM

Matrix: Waste Water

<u>Analyte Name</u>	<u>SampResult</u>	<u>DUPRes.</u>	<u>RPD</u>	<u>RPDLim</u>	<u>Flag</u>
Chemical Oxygen Demand	111	114	2.7	20	

LCS/LCSD REPORT

Analysis: Chemical Oxygen Demand (Colorimetric, Automated; Manual) - C MB: T070518017-MB
Prep Date: 5/18/2007

MB Anal. Date: 5/18/2007 5:38:46PM

Units: mg/L

LCS Anal. Date: 5/18/2007 5:38:46PM LCSD Anal. Date: 5/18/2007 5:38:46PM Matrix: Aqueous

<u>Analyte Name</u>	<u>SampResult</u>	<u>LCSRes.</u>	<u>SDRes.</u>	<u>SPLev</u>	<u>SPDLev</u>	<u>Recov.</u>	<u>SD Recov</u>	<u>RPD</u>	<u>Recov Lim</u>	<u>RPDLim</u>	<u>Flag</u>
Chemical Oxygen Demand	ND	55.0	58.0	50.0	50.0	110.0	116.0	5.3	80 - 120	20	

MS REPORT

Analysis: Chemical Oxygen Demand (Colorimetric, Automated; Manual) - C Parent: B0705082-03A
Prep Date: 5/18/2007

Samp. Anal. Date: 5/18/2007 5:38:46PM

Units: mg/L

MS Anal. Date: 5/18/2007 5:38:46PM

Matrix: Waste Water

<u>Analyte Name</u>	<u>SampResult</u>	<u>MSRes.</u>	<u>SPLev</u>	<u>Recov.</u>	<u>Recov Lim</u>	<u>Flag</u>
Chemical Oxygen Demand	111	160	50.0	98.0	70 - 130	

Prep Batch: T070516005

SAMPLE DUPLICATE REPORT

Analysis: Inorganic Anions by Ion Chromatography - Nitrate&Nitrite by IC Base Sample: B0705039-01A
Prep Date: 5/14/2007

Samp. Anal. Date: 5/16/2007 6:48:54PM

Units: mg/L

DUP Anal. Date: 5/16/2007 7:07:17PM

Matrix: Waste Water

<u>Analyte Name</u>	<u>SampResult</u>	<u>DUPRes.</u>	<u>RPD</u>	<u>RPDLim</u>	<u>Flag</u>
Total Nitrate & Nitrite as N	ND	ND	0.0	30	

LCS/LCSD REPORT

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Tests Run at: Analytica Environmental Laboratories - Thornton, Colorado

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Project Number:

Prep Batch: T070516005

QUALITY CONTROL REPORT

LCS/LCSD REPORT

Analysis: Inorganic Anions by Ion Chromatography - Nitrate&Nitrite by IC MB: T070516005-MB

Prep Date: 5/14/2007

MB Anal. Date: 5/15/2007 8:02:53PM

Units: mg/L

LCS Anal. Date: 5/15/2007 8:21:15PM LCSD Anal. Date: 5/15/2007 8:39:39PM Matrix: Aqueous

Analyte Name	SampResult	LCSRes.	SDRes.	SPLev	SPDLev	Recov.	SD Recov	RPD	Recov Lim	RPDLim	Flag
Total Nitrate & Nitrite as N	ND	5.34	5.30	5.00	5.00	106.8	106.0	0.8	90 - 110	20	

MS REPORT

Analysis: Inorganic Anions by Ion Chromatography - Nitrate&Nitrite by IC Parent: B0705039-01A

Prep Date: 5/14/2007

Samp. Anal. Date: 5/16/2007 6:48:54PM

Units: mg/L

MS Anal. Date: 5/16/2007 7:25:40PM

Matrix: Waste Water

Analyte Name	SampResult	MSRes.	SPLev	Recov.	Recov Lim	Flag
Total Nitrate & Nitrite as N	ND	5.26	5.00	105.2	70 - 130	

Prep Batch: T070515019

SAMPLE DUPLICATE REPORT

Analysis: 365.2 - Phosphorous by colorimetry - Total Phos

Base Sample: F0705020-01E

Prep Date: 5/15/2007

Samp. Anal. Date: 5/15/2007 12:32:00PM

Units: mg/L

DUP Anal. Date: 5/15/2007 12:32:00PM

Matrix: Aqueous

Analyte Name	SampResult	DUPRes.	RPD	RPDLim	Flag
Phosphorus, Total and Ortho	ND	ND	0.0	20	

LCS/LCSD REPORT

Analysis: 365.2 - Phosphorous by colorimetry - Total Phos

MB: T070515019-MB

Prep Date: 5/15/2007

MB Anal. Date: 5/15/2007 12:32:00PM

Units: mg/L

LCS Anal. Date: 5/15/2007 12:32:00PM LCSD Anal. Date: 5/15/2007 12:32:00PM Matrix: Aqueous

Analyte Name	SampResult	LCSRes.	SDRes.	SPLev	SPDLev	Recov.	SD Recov	RPD	Recov Lim	RPDLim	Flag
Phosphorus, Total and Ortho	ND	0.477	0.500	0.500	0.500	95.4	100.0	4.7	80 - 120	20	

MS REPORT

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Tests Run at: Analytica Environmental Laboratories - Thornton, Colorado

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Project Number:

Prep Batch: T070515019

QUALITY CONTROL REPORT

MS REPORT

Analysis: 365.2 - Phosphorous by colorimetry - Total Phos

Parent: F0705020-01E

Prep Date: 5/15/2007

Samp. Anal. Date: 5/15/2007 12:32:00PM

Units: mg/L

MS Anal. Date: 5/15/2007 12:32:00PM

Matrix: Aqueous

Analyte Name	SampResult	MSRes.	SPLev	Recov.	Recov Lim	Flag
Phosphorus, Total and Ortho	ND	0.533	0.500	106.6	70 - 130	

Prep Batch: T070517001

SAMPLE DUPLICATE REPORT

Analysis: 351.3 - Nitrogen,Kjeldahl, Total - TKN by dist/titration

Base Sample: B0705122-01A

Prep Date: 5/17/2007

Samp. Anal. Date: 5/17/2007 4:39:56PM

Units: mg/L

DUP Anal. Date: 5/17/2007 4:39:56PM

Matrix: Aqueous

Analyte Name	SampResult	DUPRes.	RPD	RPDLim	Flag
Nitrogen, Total Kjeldahl	2.33	2.27	2.6	20	

LCS/LCSD REPORT

Analysis: 351.3 - Nitrogen,Kjeldahl, Total - TKN by dist/titration

MB: T070517001-MB

Prep Date: 5/17/2007

MB Anal. Date: 5/17/2007 4:39:56PM

Units: mg/L

LCS Anal. Date: 5/17/2007 4:39:56PM LCSD Anal. Date: 5/17/2007 4:39:56PM

Matrix: Aqueous

Analyte Name	SampResult	LCSRes.	SDRes.	SPLev	SPDLv	Recov.	SD Recov	RPD	Recov Lim	RPDLim	Flag
Nitrogen, Total Kjeldahl	ND	2.19	2.32	2.00	2.00	109.5	116.0	5.8	80 - 120	20	

MS REPORT

Analysis: 351.3 - Nitrogen,Kjeldahl, Total - TKN by dist/titration

Parent: B0705122-01A

Prep Date: 5/17/2007

Samp. Anal. Date: 5/17/2007 4:39:56PM

Units: mg/L

MS Anal. Date: 5/17/2007 4:39:56PM

Matrix: Aqueous

Analyte Name	SampResult	MSRes.	SPLev	Recov.	Recov Lim	Flag
Nitrogen, Total Kjeldahl	2.33	6.58	4.00	106.3	80 - 120	

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

Tests Run at: Analytica Environmental Laboratories - Thornton, Colorado

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Project Number:

Prep Batch: T070516004

QUALITY CONTROL REPORT

SAMPLE DUPLICATE REPORT

Analysis: 350.2 - Ammonia, Titration Method - Ammonia, Dist./Titration
Base Sample: F0705177-01A
Prep Date: 5/16/2007

Samp. Anal. Date: 5/16/2007 4:26:00PM

Units: mg/L

DUP Anal. Date: 5/16/2007 4:26:00PM

Matrix: Aqueous

<u>Analyte Name</u>	<u>SampResult</u>	<u>DUPRes.</u>	<u>RPD</u>	<u>RPDLim</u>	<u>Flag</u>
Ammonia as N	19.8	19.9	0.5	20	

LCS/LCSD REPORT

Analysis: 350.2 - Ammonia, Titration Method - Ammonia, Dist./Titration
MB: T070516004-MB
Prep Date: 5/16/2007

MB Anal. Date: 5/16/2007 4:26:00PM

Units: mg/L

LCS Anal. Date: 5/16/2007 4:26:00PM LCSD Anal. Date: 5/16/2007 4:26:00PM Matrix: Aqueous

<u>Analyte Name</u>	<u>SampResult</u>	<u>LCSRes.</u>	<u>SDRes.</u>	<u>SPLev</u>	<u>SPDLev</u>	<u>Recov.</u>	<u>SD Recov</u>	<u>RPD</u>	<u>Recov Lim</u>	<u>RPDLim</u>	<u>Flag</u>
Ammonia as N	ND	2.11	2.13	2.00	2.00	105.5	106.5	0.9	80 - 120	20	

MS REPORT

Analysis: 350.2 - Ammonia, Titration Method - Ammonia, Dist./Titration
Parent: F0705177-01A
Prep Date: 5/16/2007

Samp. Anal. Date: 5/16/2007 4:26:00PM

Units: mg/L

MS Anal. Date: 5/16/2007 4:26:00PM

Matrix: Aqueous

<u>Analyte Name</u>	<u>SampResult</u>	<u>MSRes.</u>	<u>SPLev</u>	<u>Recov.</u>	<u>Recov Lim</u>	<u>Flag</u>
Ammonia as N	19.8	22.4	2.00	130.0	70 - 130	NOTE 2

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

FOOTNOTES TO QC REPORT

Note 1: Results are shown to three significant figures to avoid rounding errors in calculations.

Note 2: If the sample concentration is greater than 4 times the spike level, a recovery is not meaningful, and the result should be used as a replicate. In such cases the spike is not as high as expected random measurement variability of the sample result itself.

Note 3: For sample duplicates, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample and duplicate results are not five times the PQL or greater, then the RPD is not expected to fall within the window shown and the comparison should be made on the basis of the absolute difference. Analytica uses the criterion that the absolute difference should be less than the PQL for water or less than 2XPQL for other matrices.

Note 4: For serial dilutions, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample result is not 50 times the MDL or greater, then the fact that the RPD does not meet the 10% criterion has little significance. Otherwise it indicates that a matrix bias may exist at the analytical step.

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

QC BATCH ASSOCIATIONS - BY METHOD BLANK

Lab Project ID: 72,024 Lab Project Number: J0705055

Prep Date: 5/5/2007

Lab Method Blank Id: J070509003-MB

Prep Batch ID: J070509003

Method: SM 2320B - Alkalinity

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
J0704164-01A	Batch QC		5/5/2007 6:00:00PM
J0705055-01A	Overboard Discharge		5/5/2007 6:00:00PM
J070509003-LCS	LCS		5/5/2007 6:00:00PM
J070509003-LCSD	LCSD		5/5/2007 6:00:00PM
J0704164-01A-MS	MS		5/5/2007 6:00:00PM
J0704164-01A-MSD	MSD		5/5/2007 6:00:00PM

Prep Date: 5/5/2007

Lab Method Blank Id: J070511001-MB

Prep Batch ID: J070511001

Method: 405.1 - Biochemical Oxygen Demand, 5 day - (BOD5)

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
J0705055-01A	Overboard Discharge		5/5/2007 6:50:00PM
J070511001-LCS	LCS		5/5/2007 1:15:00PM
J070511001-LCSD	LCSD		5/5/2007 1:15:00PM

Prep Date: 5/7/2007

Lab Method Blank Id: J070511002-MB

Prep Batch ID: J070511002

Method: 160.2-Residue, Gravimetric, Non-filterable, 105°C - (TSS)

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
J0705054-05A	Batch QC		5/7/2007 1:35:00PM
J0705055-01A	Overboard Discharge		5/7/2007 1:35:00PM
J0705056-01A	Batch QC		5/7/2007 1:35:00PM
J070511002-LCS	LCS		5/7/2007 1:35:00PM
J070511002-LCSD	LCSD		5/7/2007 1:35:00PM
J0705054-05A-DUP	DUP		5/7/2007 1:35:00PM
J0705056-01A-DUP	DUP		5/7/2007 1:35:00PM

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

QC BATCH ASSOCIATIONS - BY METHOD BLANK

Lab Project ID: 72,024 Lab Project Number: J0705055

Prep Date: 5/15/2007

Lab Method Blank Id: T070515019-MB

Prep Batch ID: T070515019

Method: 365.2 - Phosphorous by colorimetry - Total Phos

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
F0705020-01E	Batch QC		5/15/2007 12:32:00PM
J0705055-01F	Overboard Discharge		5/15/2007 12:32:00PM
T070515019-LCS	LCS		5/15/2007 12:32:00PM
T070515019-LCSD	LCSD		5/15/2007 12:32:00PM
F0705020-01E-DUP	DUP		5/15/2007 12:32:00PM
F0705020-01E-MS	MS		5/15/2007 12:32:00PM

Prep Date: 5/14/2007

Lab Method Blank Id: T070515020-MB

Prep Batch ID: T070515020

Method: 1664 Hexane Extractable Material - TPH w/SGT

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
J0705055-01B	Overboard Discharge		5/14/2007 11:00:00AM
T070515020-LCS	LCS		5/14/2007 11:00:00AM
T070515020-LCSD	LCSD		5/14/2007 11:00:00AM

Prep Date: 5/16/2007

Lab Method Blank Id: T070516004-MB

Prep Batch ID: T070516004

Method: 350.2 - Ammonia, Titration Method - Ammonia, Dist./Titrat

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
F0705177-01A	Batch QC		5/16/2007 4:26:00PM
J0705055-01F	Overboard Discharge		5/16/2007 4:26:00PM
T070516004-LCS	LCS		5/16/2007 4:26:00PM
T070516004-LCSD	LCSD		5/16/2007 4:26:00PM
F0705177-01A-DUP	DUP		5/16/2007 4:26:00PM
F0705177-01A-MS	MS		5/16/2007 4:26:00PM

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

QC BATCH ASSOCIATIONS - BY METHOD BLANK

Lab Project ID: 72,024 Lab Project Number: J0705055

Prep Date: 5/14/2007

Lab Method Blank Id: T070516005-MB

Prep Batch ID: T070516005

Method: Inorganic Anions by Ion Chromatography - Nitrate&Nitrite by IC

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
T070516005-LCS	LCS	070514_057.DXD	5/15/2007 8:21:15PM
T070516005-LCSD	LCSD	070514_058.DXD	5/15/2007 8:39:39PM
B0705039-01A	Batch QC	070516_023.DXD	5/16/2007 6:48:54PM
B0705039-01A-DUP	DUP	070516_024.DXD	5/16/2007 7:07:17PM
B0705039-01A-MS	MS	070516_025.DXD	5/16/2007 7:25:40PM
J0705055-01F	Overboard Discharge	70518A_005.DXD	5/19/2007 1:13:04PM

Prep Date: 5/17/2007

Lab Method Blank Id: T070517001-MB

Prep Batch ID: T070517001

Method: 351.3 - Nitrogen,Kjeldahl, Total - TKN by dist/titration

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
B0705122-01A	Batch QC		5/17/2007 4:39:56PM
J0705055-01F	Overboard Discharge		5/17/2007 4:39:56PM
T070517001-LCS	LCS		5/17/2007 4:39:56PM
T070517001-LCSD	LCSD		5/17/2007 4:39:56PM
B0705122-01A-DUP	DUP		5/17/2007 4:39:56PM
B0705122-01A-MS	MS		5/17/2007 4:39:56PM

Prep Date: 5/11/2007

Lab Method Blank Id: A070517008-MB

Prep Batch ID: A070517008

Method: SM5310B - TOC

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
J0705055-01E	Overboard Discharge		5/11/2007 9:06:46PM
A070517008-LCS	LCS		5/11/2007 9:06:46PM
A070517008-LCSD	LCSD		5/11/2007 9:06:46PM

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

QC BATCH ASSOCIATIONS - BY METHOD BLANK

Lab Project ID: 72,024

Lab Project Number: J0705055

Prep Date: 5/18/2007

Lab Method Blank Id: T070518017-MB

Prep Batch ID: T070518017

Method: Chemical Oxygen Demand (Colorimetric, Automated; Manual) - C

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
B0705082-03A	Batch QC		5/18/2007 5:38:46PM
J0705055-01F	Overboard Discharge		5/18/2007 5:38:46PM
T070518017-LCS	LCS		5/18/2007 5:38:46PM
T070518017-LCSD	LCSD		5/18/2007 5:38:46PM
B0705082-03A-DUP	DUP		5/18/2007 5:38:46PM
B0705082-03A-MS	MS		5/18/2007 5:38:46PM

DATA FLAGS AND DEFINITIONS

The PQL is the Method Quantitation Limit as defined by USACE.

Reporting Limit: Limit below which results are shown as "ND". This may be the PQL, MDL, or a value between. See the report conventions below.

Result Field:

ND = Not Detected at or above the Reporting Limit

NA = Analyte not applicable (see Case Narrative for discussion)

Qualifier Fields:

LOW = Recovery is below Lower Control Limit

HIGH = Recovery, RPD, or other parameter is above Upper Control Limit

E = Reported concentration is above the instrument calibration upper range

Organic Analysis Flags:

B = Analyte was detected in the laboratory method blank

J = Analyte was detected above MDL or Reporting Limit but below the Quant Limit (PQL)

Inorganic Analysis Flags:

J = Analyte was detected above the Reporting Limit but below the Quant Limit (PQL)

W = Post digestion spike did not meet criteria

S = Reported value determined by the Method of Standard Additions (MSA)

Other Flags may be applied. See Case Narrative for Description

Detailed Analytical Report

Analytica Environmental Laboratories, Inc.

Workorder (SDG): J0705055

Project: M/V Malaspina Compliance

Client: Admiralty Environmental, LLC

Client Project Number: AMHS

REPORTING CONVENTIONS FOR THIS REPORT

J0705055

<u>TestName</u>	<u>TestPkgName</u>	<u>Basis</u>	<u># Sig Figs</u>	<u>Reporting Limit</u>
120.1/120.1 (Aqueous) - (EC)		As Received		Report to PQL
150.1/150.1 (Aqueous) - (pH)		As Received		Report to PQL
160.2/160.2 (Aqueous) - (TSS)		As Received		Report to PQL
160.5/160.5 (Aqueous) - (SS)		As Received		Report to PQL
1664/1664 (Aqueous) - TPH w/SGT		As Received		Report to PQL
2320B/2320B (Aqueous) - Alkalinity		As Received		Report to PQL
300.0/300.0 (Aqueous) - Nitrate&Nitrite by IC		As Received		Report to PQL
350.2/4500-NH3B (Aqueous) - Ammonia, Dist./Titrat		As Received		Report to PQL
351.3 (Aqueous) - TKN by dist/titration		As Received		Report to PQL
365.2/365.2 (Aqueous) - Total Phos		As Received		Report to PQL
405.1/405.1 (Aqueous) - (BOD5)		As Received		Report to PQL
410.4M/410.4M (Aqueous) - COD		As Received		Report to PQL
4500-CIG/4500-CIG (Aqueous) - Total Residual Chlorin		As Received		Report to PQL
5310B/5310B (Aqueous) - TOC		As Received		Report to PQL
9222D/9222D (Aqueous) - FC by Memb. Filtration		As Received		Report to PQL



Cooler Receipt Form

Juneau Cooler Receipt

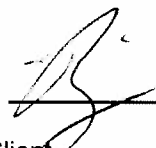
Client: Admiralty Environmental, LLC Client Code: 801002
Project: M/V Malaspina Compliance

Order #: J0705055

Cooler ID: 1

A. Preliminary Examination Phase:

Date cooler opened: 5/5/2007
Cooler opened by: RJ

Signature: 

1. Was airbill Attached? N/A

Airbill #:

Carrier Name: Client

2. Custody Seals? N/A

How many? 0

Location:

Seal Name:

3. Seals intact? N/A

4. COC Attached? Yes

Properly Completed? Yes

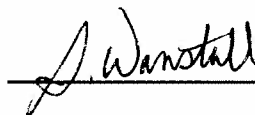
Signed by AEL employee? Yes

5. Project Identification from custody paper: Admiralty Malaspina

6. Preservative: WetIce

Temperature: 1.1

Designated person initial here to acknowledge receipt:



Date: 5/7/07

COMMENTS:

B. Log-In Phase: Samples Log-in Date: 5/5/2007 Log-in By: LW

1. Packing Type: Other

2. Were samples in separate bags? Yes

3. Were containers intact? Yes

Labels agree with COC? Yes

4. Number of bottles received: 8

Number of samples received: 1

5. Correct containers used? Yes

Correct preservatives added? Yes

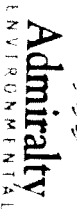
6. Sufficient sample volume? Yes

7. Bubbles in VOA samples? N/A

8. Was Project manager called and status discussed? No

9. Was anyone called? No Who was called? _____ By whom? _____ Date: _____

COMMENTS:



CHAIN OF CUSTODY/TRANSMITTAL RECORD

Date of

[illegible]

*COMMENTS should include condition of samples on kit upon receipt, temperature, shipping method, etc.

understand



Cooler Receipt Form

Anchorage Cooler Receipt

Client: Admiralty Environmental, LLC Client Code: 801002
Project: M/V Malaspina Compliance

Order #: J0705055

Cooler ID: 2

A. Preliminary Examination Phase:

Date cooler opened: 5/11/2007
Cooler opened by: mw

Signature: MW

1. Was airbill Attached? Airbill #: Carrier Name: Other
2. Custody Seals? Yes How many? 1 Location: cooler Seal Name: LW
3. Seals intact? Yes
4. COC Attached? Yes Properly Completed? Yes Signed by AEL employee? Yes
5. Project Identification from custody paper: Malaspina
6. Preservative: BlueGel Temperature: 5.5

Designated person initial here to acknowledge receipt: MW

Date: 5/11/07

COMMENTS:

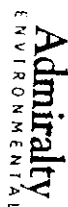
B. Log-In Phase:

Samples Log-in Date: 5/11/2007

Log-in By: mw

1. Packing Type: Bubblewrap
2. Were samples in separate bags? Yes
3. Were containers intact? Yes Labels agree with COC? Yes
4. Number of bottles received: 1 Number of samples received: 1
5. Correct containers used? Yes Correct preservatives added? Yes
6. Sufficient sample volume? Yes
7. Bubbles in VOA samples? N/A
8. Was Project manager called and status discussed? No
9. Was anyone called? No Who was called? By whom? Date:

COMMENTS:



Admiralty Environmental
431 N. Franklin Suite 101
Juneau, Ak. 99801
(907)463-4415 fax (480) 247-4476

CHAIN OF CUSTODY/TRANSMITTAL RECORD
page ____ of ____

[illegible]

* COMMENTS should include condition of samples or kit; upon receipt, temperature, shipping method etc.

under us to dry



Cooler Receipt Form

Thornton Cooler Receipt

Client: Admiralty Environmental, LLC **Client Code:** 801002
Project: M/V Malaspina Compliance

Order #: J0705055

Cooler ID: 3

A. Preliminary Examination Phase:

Date cooler opened: 5/10/2007

Cooler opened by: LQ

Signature:

1. Was airbill Attached? Yes

Airbill #: 790243679738

Carrier Name: FedEx

2. Custody Seals? Yes

How many? 1

Location: top

Seal Name: LW

3. Seals intact? Yes

4. COC Attached? Yes

Properly Completed? Yes

Signed by AEL employee? Yes

5. Project Identification from custody paper: Malaspina

6. Preservative: BlueGel

Temperature: 40.0

Designated person initial here to acknowledge receipt:

Date:

5/10/07

COMMENTS:

B. Log-In Phase: **Samples Log-in Date:** 5/10/2007 **Log-in By:** LQ

1. Packing Type: Bubblewrap

2. Were samples in separate bags? Yes

3. Were containers intact? Yes

Labels agree with COC? Yes

4. Number of bottles received: 2

Number of samples received: 1

5. Correct containers used? Yes

Correct preservatives added? Yes

6. Sufficient sample volume? Yes

7. Bubbles in VOA samples? N/A

8. Was Project manager called and status discussed? No

9. Was anyone called? No

Who was called?

By whom?

Date:

COMMENTS:

2007 Cruise Ship Sampling Checklist



Vessel Name Malaspina
Sampler Name D. Wetzel, S. Cable
Date 5/5/07
Sampling Event ID Number AE 1514

I. Notification

- ☒ ADEC project manager notified 36 hours prior to the sampling event

II. Type of Sampling

- ☒ Conventional pollutants only
☐ Conventional and priority pollutants.
 ☐ If 2nd unannounced sample, must be > 21 days after the first sampling event.
☐ USCG Continuous Compliance Parameters
 ☐ If 2nd continuous compliance sample for month, must be at least 24 hours after first sample.

III. Sampling Notes (to include:)

- ☒ Vessel name
☒ Names of sampling personnel
☒ Names of shipboard assistants
☐ Signature or initials by the vessel crew indicating that the sample port is correct
☒ Sample ID clearly stating where the sample was taken
☒ Sample date and times recorded on COC
☒ Field measurements: pH, chlorine residual, and temp recorded on COC
☐ Records collected on discharge flow rates (always) and holding tank volumes (only for underway sampling)
☒ Sample ports within 50 feet of the point of overboard discharge
☒ Nature of sample recorded (composite or grab)
☒ Waste type recorded (blackwater, graywater, or mixed)
☐ If deviations from VSSP and/or QA/QCP noted, reported to ADEC/USCG
☐ Photographs taken of samples and sampling port
☐ If unannounced sampling, sampler verified that vessel is discharging
☐ Latitude/longitude and speed at time of discharge being sampled is recorded (only for underway sampling)
☐ Copy of the Discharge record for the sampled discharge included
☒ Chain of custody properly completed
☒ Samples delivered to laboratory within holding times for analyses



Admiralty Environmental
431 N. Franklin Street, Suite 101
Juneau, AK 99801
(907) 463-4415 fax (480) 247-4476

2007 Cruise Ship Sampling Field Notes

Date: Saturday, May 05, 2007

AE1514

Vessel Name: Malaspina

Sampler(s): David Wetzel, Susan Cable

Sample Port ID #1: Overboard discharge

(Grab) / Composite

(Blackwater / Graywater / Mixed)

Notes:

Ship discharging overboard at
time of sampling.

Sample Port ID #2: 0

(Grab / Composite)

(Blackwater / Graywater / Mixed)

Notes:

Sample Port ID #3: 0

(Grab / Composite)

(Blackwater / Graywater / Mixed)

Notes:

Sample Port ID #4: _____

(Grab / Composite)

(Blackwater / Graywater / Mixed)

Notes:

<u>Field Test Results</u>	<u>#1</u>	<u>#2</u>	<u>#3</u>	<u>#4</u>
Time, 24-hour	<u>15:55</u>	<u>:</u>	<u>:</u>	<u>:</u>
pH, units	<u>7.89</u>			
Temp, C	<u>14.6</u>			
Free Chlorine, mg/L	<u>33.2</u>			
Total Chlorine, mg/L	<u>24.8</u>			

As the accompanying shipboard personnel, I hereby acknowledge that I have witnessed this sampling event and can attest that the samples were collected from the correct sampling port(s) as designated in this vessel's Vessel Specific Sampling Plan (VSSP):

Signature

Tom Myatt
Printed Name

Appendix H

Best Management Practices (BMP) Plan Criteria

**Alaska Department of Environmental Conservation
Best Management Practices Plan Approval Criteria and Other Plan Requirements
(January 2006)**

Approval Criteria

ADEC will approve a BMP plan if the department finds that:

- a. the application is complete;
- b. the vessel's keel was laid before January 1, 2004; and
- c. the vessel cannot practicably comply with standard terms and conditions, but the BMP plan:
 1. states the vessel does not discharge wastewater while the vessel is traveling at a speed of less than six knots or is located less than one nautical mile from shore; or
 2. includes operating practices that prohibit wastewater discharge in certain areas and will protect the environment to the maximum extent feasible while the vessel is traveling at a speed of less than six knots or is discharging wastewater within one nautical mile of shore. The plan must describe operating practices that:
 - reduce in the volume of wastewater discharged,
 - improve the quality of wastewater discharged by reducing fecal coliform bacteria and residual chlorine,
 - minimize the risk to human health caused by exposure to the vessel's wastewater, or
 - enhance dispersion of wastewater discharged from a vessel.

Additional Requirements

The vessel owner or operator must:

- a. maintain the ADEC-approved BMP plan on board the vessel at all times,
- b. maintain the documentation records specified in the DEC-approved BMP plan on board the vessel for 12 months,
- c. provide DEC access, upon request, to records during sampling and inspections, and
- d. provide information, including the recordkeeping that shows compliance with the BMP plan, to DEC within 21 days of a written request as described under 18 AAC 69.050(d).

Approval, Expiration, Modification, Transfer and Termination of the BMP Plan

a. DEC will approve or deny a plan within 30 days of receipt of a complete application. Upon determination by the DEC that a BMP plan submitted under AS 46.03.463(e) is in compliance with this section, the DEC will approve the plan and issue a written or electronic extension of time for compliance with AS 46.03.463(b) and (c).

b. The BMP plan is valid for three years from the date of DEC approval unless terminated as described below. All BMP plans will expire no later than December 31,, 2016.

c. The BMP plan is transferable to a new owner or operator for the remainder of the time for which the plan is approved provided the succeeding owner or operator agrees, in writing to DEC, to assume responsibility for compliance with the BMP.

d. A vessel owner or operator may submit a request for modification to an existing BMP plan to the DEC. The owner or operator may not implement the modification until the owner or operator receives DEC approval. The BMP plan will keep its original expiration date, or the owner or operator can request DEC to treat the modification as a new BMP plan. The operator must submit a modification in the same manner as the original application. The DEC shall approve or disapprove the modification within 30 days of receipt of a complete application.

e. The DEC may terminate approval of a plan after giving the vessel owner or operator 30-calendar day notice, based on one of the following conditions.

1. At the request of a vessel owner/operator; or
2. DEC may terminate approval if the department finds that
 - i. the owner or operator failed to operate according to an approved BMP plan, or
 - ii. changes in the factual basis underlying the application have occurred, including a significant change in the operating area or wastewater discharge quantity or quality.

Appendix J

Correspondence with ADEC

Ravi Shankar

From: Faure, Albert (DEC) [albert.faure@alaska.gov]
Sent: Thursday, February 21, 2008 1:04 PM
To: Ravi Shankar
Cc: White, Edward E (DEC); Koch, Denise (DEC); mark.perez@alaska.gov
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

Hi Ravi:

That is correct; it will refer to 'residual chlorine'.

When your report is completed we would appreciate to receive a copy of that report.

Please do not hesitate if you have further questions.

Kind Regards,

Albert Faure

-----Original Message-----

From: Ravi Shankar [mailto:rshankar@foss.com]
Sent: Thursday, February 21, 2008 11:48 AM
To: Faure, Albert (DEC)
Cc: Dave Dumont
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

Albert,

Thank you for your clarification. I would therefore assume that the 'total chlorine levels' in the approved BMP Plan are to be read as 'Residual chlorine'. I greatly appreciate your feedback on the advanced water treatment guidelines.

Best regards,

Ravi Shankar

-----Original Message-----

From: Faure, Albert (DEC) [mailto:albert.faure@alaska.gov]
Sent: Thursday, February 21, 2008 11:28 AM
To: Ravi Shankar
Cc: mark.perez@alaska.gov; White, Edward E (DEC); Koch, Denise (DEC); Flores, Narciso (DOT)
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

Dear Mr. Shankar:

Thanks for the e-mail. I was looking up the responses we previously gave to the AMHS, just to make sure.

(Q): Chlorine limit / level / "type" as set out in the BMP:

(A): We require residual chlorine be measured. Standard Methods (4500-Cl A) states that "In wastewater, the differentiation between free chlorine and combined chlorine ordinarily is not made because wastewater chlorination seldom is carried far enough to produce free chlorine." 19ed.

(Q): small passenger vessels what level of effluent values apply? Which effluent limits for AWTs systems on small vessels?

(A): The effluent limits for small passenger vessels (not to exceed) Fecal 200 col per 100 milliliters and TSS 150 milligrams. This is valid for the any of the waste water treatment systems on board. Under approved BMP plan can deviated from this limits, however it is clear that the "effluent BMP deviation" for Fecal and TSS should be in the ball park of the set effluent limits. Note that the State regulation applies for both Gray and Black water![AS 46.03.463]

CPVEC sample results / experiences show that well maintained and operated AWTs systems should be capable to meet these numbers.

The State laws do not include specific effluent limits for AWTs systems on small vessels, except for Fecal and TSS (see reference above).

It is our experience; based on AWTs water treatment systems that they are able to meet the 33CFR159 standards, and the Alaska Discharge limits for large vessels. A copy of these limits are attached (Table 1). Please note that that the AWTs systems do not meet consistently metals limits and ammonia limits, so we do see in the AWTs sample results exceedances of the metal and ammonia limits.

Please visit for overview sample results / effluent quality performances

: http://www.dec.state.ak.us/water/cruise_ships/reports.htm

The "End of Season Reports" both small and large vessels are listed.

This will give you a good feel what the AWTs systems are capable to meet.

We like to bring under your attention that AWTs systems are installed and operated on vessels adhering to the "minimal environmental impact"

philosophy, reducing a broad range of pollutants, which include also Fecal and TSS. It is our experience in general that the AWTs operators has a high level of system operational and maintenance commitment; just by installing and operating an AWTs system would not necessary produce "automatically" the effluent results as indicated in our reports.

At this time we are not aware of legislation, or plans to develop legislation that include AWTs requirements for small vessels.

Again, the CPVEC team does support vessel owners operators "minimal environmental impact" philosophy by installing and operating AWTs systems on board of vessels; especially where is no regulatory obligation to do so.

We do see recently that the public appears more and more interested in reducing environmental waste water discharge impacts of vessels, the state ferries and small pocket cruisers in particular.

In case of questions, please do not hesitate to contact us.

Kind Regards,

Albert Faure

NEW !!!! E-mail address: albert.faure@alaska.gov

Albert Faure

Environmental Engineer

State of Alaska

Department of Environmental Conservation Commercial Passenger Vessel Compliance Program 410

Willoughby Ave., Suite 303

Juneau Alaska 99801

Tel: + (907) 465 - 5279
Fax: + (907) 465 - 5177

-----Original Message-----

From: Ravi Shankar [mailto:rshankar@foss.com]
Sent: Thursday, February 21, 2008 8:52 AM
To: Faure, Albert (DEC)
Cc: Dave Dumont
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

Albert,

Reference to our brief telecon yesterday, I would appreciate for your clarification on the type of chlorine (total or free) levels to be maintained in the effluent as per the BMP and also regulatory limits applicable in Alaska for the advanced water treatment systems (marine).

Look forward to your responses.

Best regards,

Ravi Shankar

-----Original Message-----

From: Faure, Albert (DEC) [mailto:albert.faure@alaska.gov]
Sent: Tuesday, January 08, 2008 4:03 PM
To: Ravi Shankar
Cc: mark.perez@alaska.gov; Koch, Denise (DEC); White, Edward E (DEC)
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

Dear Ravi:

Thanks for the telephone call. We understand to you need "bench marks" for some of the elements in the effluent. As was mentioned in our call, please be aware that our current regulations for small passenger vessels do not have regulatory limits / values set for BOD, Oil & Grease.

However, we do have for you some recommendations that may helpful and can be used in evaluation the effluent performance of the AMHS fleet MSD systems.

So for the AMHS vessels we strongly recommend:

@ADEC will use 0.100 mg/L as compliance evaluation level for this parameter. This is previously used for the small vessel effluent performance evaluation especially to limit, restrict, the environmental impacts from "over dosages" of chlorine in the effluent.
@For BOD we recommend monthly average of 30 mg/L and Daily maximum 60 mg/L. This is a kind of "secondary treatment" level; however BOD loads can be greatly reduced by influent control from galley, cold stores, food disposals etc.) @Oil and Grease, you can not cause a sheen on the water (effluent) we do have recommendation limits for: Oil and Grease and petroleum products:

TAH (aromatic) max. 10 ug/L (EPA method 624) and TAH (aqueous) max 15ug/L (EPA method 625.

Again these "recommendation levels" for BOD and Oil & Grease are for the small vessel non regulatory, but we appreciate that you consider these levels for the effluent evaluation of the MSD system.

Please note that the vessels that operate under an approved BMP plan have "demonstrated" that it could not meet the TSS and FC limits, but are subject to the BMP actions that would minimize the environmental impacts. The BMP plans are three years after issuance date valid, after December 31, 2016 the BMP option is not possible anymore. Unless the law changes the vessels must meet than the stringent standards. We have also enclosed an overview of the BPM regulation, and the needed actions to be taken when AMHS decide to physically change the MSD operations/ installations.

As you probably know we do sample (regulatory) twice seasonally the AMHS ferries, so we can not refer to "monthly averages" etc, so we would recommend to try to stay under the 60 mg/L daily BOD value. Please note that BOD can be affected by influent regimes (e.g. galley waste, ice cream etc).

Please let us know if this answers all your questions.

Kind Regards,

Albert Faure

yed Test Procedure for Total Coliform.pdf)

Ravi Shankar

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Sent: Thursday, February 21, 2008 11:28 AM
To: Ravi Shankar
Cc: mark.perez@alaska.gov; White, Edward E (DEC); Koch, Denise (DEC); Flores, Narciso (DOT)
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels
Attachments: Proposed General Permit Table 1.PDF

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Kind Regards,

Albert Faure

NEW !!!! E-mail address: albert.faure@alaska.gov

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Department of Environmental Conservation Commercial Passenger Vessel Compliance Program 410
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Juneau Alaska 99801
Tel: + (907) 465 - 5279
Fax: + (907) 465 - 5177

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To: Faure, Albert (DEC)
Cc: Dave Dumont
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

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-----Original Message-----

From: Faure, Albert (DEC) [<mailto:albert.faure@alaska.gov>]
Sent: Tuesday, January 08, 2008 4:03 PM
To: Ravi Shankar
Cc: mark.perez@alaska.gov; Koch, Denise (DEC); White, Edward E (DEC)
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

Dear Ravi:

Thanks for the telephone call. We understand to you need "bench marks" for some of the elements in the effluent. As was mentioned in our call, please be aware that our current regulations for small passenger vessels do not have regulatory limits / values set for BOD, Oil & Grease.

However, we do have for you some recommendations that may helpful and can be used in evaluation the effluent performance of the AMHS fleet MSD systems.

So for the AMHS vessels we strongly recommend:

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@For BOD we recommend monthly average of 30 mg/L and Daily maximum 60 mg/L. This is a kind of "secondary treatment" level; however BOD loads can be greatly reduced by influent control from galley, cold stores, food disposals etc.) @Oil and Grease, you can not cause a sheen on the water (effluent) we do have recommendation limits for: Oil and Grease and petroleum products:

TAH (aromatic)max. 10 ug/L (EPA method 624)and TAH (aqueous) max 15ug/L (EPA method 625.

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Please note that the vessels that operate under an approved BMP plan have "demonstrated" that it could not meet the TSS and FC limits, but are subject to the BMP actions that would minimize the environmental impacts. The BMP plans are three years after issuance date valid, after December 31, 2016 the BMP option is not possible anymore. Unless the law changes the vessels must meet than the stringent standards. We have also enclosed an overview of the BPM regulation, and the needed actions to be taken when AMHS decide to physically change the MSD operations/ installations.

As you probably know we do sample (regulatory) twice seasonally the AMHS ferries, so we can not refer to "monthly averages" etc, so we would recommend to try to stay under the 60 mg/L daily BOD value. Please note that BOD can be affected by influent regimes (e.g. galley waste, ice cream etc).

Please let us know if this answers all your questions.

Kind Regards,

Albert Faure

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Sent: Tuesday, January 08, 2008 4:03 PM
To: Ravi Shankar
Cc: mark.perez@alaska.gov; Koch, Denise (DEC); White, Edward E (DEC)
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels
Attachments: AMHS bmp_approval_criteria.pdf

Dear Ravi:

Thanks for the telephone call. We understand to you need "bench marks" for some of the elements in the effluent. As was mentioned in our call, please be aware that our current regulations for small passenger vessels do not have regulatory limits / values set for BOD, Oil & Grease.

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Please let us know if this answers all your questions.

Kind Regards,

Albert Faure

-----Original Message-----

From: Ravi Shankar [mailto:rshankar@foss.com]
Sent: Friday, January 04, 2008 12:30 PM

To: Faure, Albert (DEC)
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

Thank you very much Albert. I am wondering if you have similar limits for the Biological Oxygen Demand (BOD), Oil, Grease, and Residual Chlorine as well for vessels under the BMP. The information is indeed valuable in guiding our approach to the issue.

Best regards,

Ravi Shankar

-----Original Message-----

From: Faure, Albert (DEC) [mailto:albert.faure@alaska.gov]
Sent: Friday, January 04, 2008 11:47 AM
To: Ravi Shankar
Cc: White, Edward E (DEC); Koch, Denise (DEC); mark.perez@alaska.gov
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

Dear Ravi,

Thanks for the e-mail. We discussed this yesterday and here is our response.

Technically the vessel must meet the "AK water quality standards", we have attached a page of this information in this e-mail. Please note that these values apply to Large vessels discharges, and can be met by using state of the art waste water treatment systems, the advanced wastewater treatment systems (AWTS). Note that there is also included a minimum sampling requirement (frequency), but this does not apply here. So please focus on the values.

Please see also: <http://www.uscg.mil/hq/g-m/mse/msd.htm>

The ferries are operating under a BMP, because these values can not be met consistently. For the vessels with a BMP plan we always focus on effluent results with chlorine less than set out in the attached documents, and the FC and TSS "according" the AS 46 03 463

Sec. 46.03.463. Prohibited discharges; limitations on discharges.

(a) Except as provided in (h) of this section, a person may not discharge untreated sewage from a commercial passenger vessel into the marine waters of the state.

(b) Except as provided in (h) of this section or under AS 46.03.462(c), a person may not discharge sewage from a commercial passenger vessel into the marine waters of the state that has suspended solids greater than 150 milligrams per liter or a fecal coliform count greater than 200 colonies per 100 milliliters except that the department may by regulation adopt a protocol for retesting for fecal coliform, if this discharge limit for fecal coliform is exceeded, under which a discharger will be considered to be in compliance with the fecal coliform limit if the geometric mean of fecal coliform count in the samples considered under the protocol does not exceed 200 colonies per 100 milliliters.

(c) Except as provided in (h) of this section or under AS 46.03.462(c), a person may not discharge graywater or other wastewater from a commercial passenger vessel into the marine waters of the state that has suspended solids greater than 150 milligrams per liter or a fecal coliform count greater than 200 colonies per 100 milliliters except that the department may by regulation adopt a protocol for retesting for fecal coliform, if this discharge limit for fecal coliform is exceeded, under which a discharger will be considered to be in compliance with the fecal coliform limit if the geometric mean of fecal coliform count in the samples considered under the protocol does not exceed 200 colonies per 100 milliliters.

(d) [Repealed, Sec. 5, 2006 Primary Election Ballot Measure No. 2].

Please visit

<http://www.legis.state.ak.us/cgi-bin/folioisa.dll/stattx07/query=46!2E03!2E460/doc/%7B@20149%7D?>
for the entire pages.

Hope this helps, and let me know.

Kind Regards,

Albert Faure

NEW !!!! E-mail address: albert.faure@alaska.gov

Albert Faure

Environmental Engineer

State of Alaska

Department of Environmental Conservation Commercial Passenger Vessel Compliance Program 410

Willoughby Ave., Suite 303

Juneau Alaska 99801

Tel: + (907) 465 - 5279

Fax: + (907) 465 - 5177

-----Original Message-----

From: Ravi Shankar [<mailto:rshankar@foss.com>]

Sent: Wednesday, January 02, 2008 1:56 PM

To: Faure, Albert (DEC)

Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

Dear Albert,

Can you please provide the current standards (maximum limits) for the following in the Alaskan waters.

- o Total Suspended Solids (TSS)
- o Fecal Coliform (FC)
- o Biological Oxygen Demand (BOD)
- o Oil and Grease
- o Residual Chlorine

As mentioned, we are in the process of updating the sanitation devices and would like to ensure proper compliance to required standards. Your early response will be greatly appreciated.

Best regards,

Ravi Shankar

-----Original Message-----

From: Faure, Albert (DEC) [<mailto:albert.faure@alaska.gov>]

Sent: Wednesday, January 02, 2008 11:21 AM

To: Ravi Shankar
Cc: White, Edward E (DEC); mark.perez@alaska.gov; Gendron, James F (DEC)
Subject: RE: 07017 : Testing of Effluent Water - AMHS Vessels

Dear Mr. Shankar:

Please find the list of Laboratories in SE Alaska that deals on regular basis with waste water samples from the AMHS vessels and cruise vessels:

@ Analytica Group

Juneau phone (907) 780 6668

@ Admiralty Environmental

Dave Wetzel

Juneau phone (907) 463 4415

@ RM Engineering / Labs

William Schulz

Ketchikan phone (907) 225 7917 ext 311

@ City of Sitka Waste Water treatment / labs

Mark B. and Mark O.

Sitka phone (907) 966 2256

Markb@cityofsitka.com

These are the labs in South East (panhandle) of Alaska.

Analytica has also a lab in Anchorage.

Kind Regards,

Albert Faure

NEW !!!! E-mail address: albert.faure@alaska.gov

Albert Faure
Environmental Engineer
State of Alaska
Department of Environmental Conservation Commercial Passenger Vessel Compliance Program 410
Willoughby Ave., Suite 303
Juneau Alaska 99801
Tel: + (907) 465 - 5279
Fax: + (907) 465 - 5177

-----Original Message-----

From: Ravi Shankar [mailto:rshankar@foss.com]
Sent: Wednesday, January 02, 2008 8:37 AM
To: Faure, Albert (DEC)
Subject: FW: 07017 : Testing of Effluent Water - AMHS Vessels

Dear Mr. Faure,

It was indeed nice talking with you today. Can you please send the labs available between Juneau and Ketchikan at your early convenience.

Best regards,

Ravi Shankar
Senior Project Manager
Harbor Marine Group
FOSS Maritime Co.
660 West Ewing St
Seattle, WA 98119
Tel : 206-270-4893

-----Original Message-----

From: Pavitt.John@epamail.epa.gov [mailto:Pavitt.John@epamail.epa.gov]
Sent: Monday, December 31, 2007 12:33 PM
To: Ravi Shankar
Subject: Fw: 07017 : Testing of Effluent Water - AMHS Vessels

Dear Mr. Shankar,

Please see the attached e-mail response regarding your question on testing discharge.

The response comes from Mr. Albert Faure with the Alaska Department of Environmental Conservation in Juneau. In Alaska, the State administers the marine vessel discharge program. Mr. Faure can be reached at 907-465-5279.

I hope this answers your question. Thank you.

John Pavitt
US EPA, Region 10, Alaska Operations Office
(907) 271-3688
(907) 271-3424 (Fax)

----- Forwarded by John Pavitt/R10/USEPA/US on 12/31/2007 11:30 AM -----

"Faure, Albert
(DEC)"
<albert.faure@alaska.gov>

12/24/2007 11:47
AM

John Pavitt/R10/USEPA/US@EPA
cc
"Gendron, James F (DEC)"
<james.gendron@alaska.gov>,
"White, Edward E (DEC)"
<edward.white@alaska.gov>

Subject
FW: 07017 : Testing of Effluent
Water - AMHS Vessels

Dear John:

Thanks for the question, have a wonderful family time and good X-mas!

We looked in the matter and our response is as follows:

The methods that are included in the previous email are listed in Standard Methods as delayed procedures (9222c or 9222E) for Total and Fecal Coliform and they are not approved for compliance testing under 40 CFR 136.

The holding time is 6 hours.

We believe that all of DEC's attempts to date to test whether bacteria samples can be held longer than 6 hours in the marine environment have demonstrated that they can not be held. There is a statistically significant difference if the samples are run with a hold time longer than 6 hours.

Therefore we believe that the "delayed procedures" is not OK for this project. The Cruise Ship Program does not accept the results of such "delayed tests" as representative effluent performance results for the AMHS ferries.

John, hope this helps, and let me know if this is sufficient.

Kind Regards,

Albert

-----Original Message-----

From: Pavitt.John@epamail.epa.gov [mailto:Pavitt.John@epamail.epa.gov]

Sent: Wednesday, December 19, 2007 11:53 AM

To: Faure, Albert (DEC)

Subject: Fw: 07017 : Testing of Effluent Water - AMHS Vessels

Hello Albert. The following question came to me from Harbor Marine Group, which is looking at sampling and testing for fecals on AK State Ferries. Do you have any guidance on the appropriate holding time for samples? Thanks.

John Pavitt

US EPA, Region 10, Alaska Operations Office

(907) 271-3688

(907) 271-3424 (Fax)

----- Forwarded by John Pavitt/R10/USEPA/US on 12/19/2007 11:50 AM -----

Tara

Martich/R10/USEPA/US

12/19/2007 11:42 AM

To
John Pavitt/R10/USEPA/US@EPA
cc
Kimberly Ogle/R10/USEPA/US@EPA
Subject
Re: Fw: 07017 : Testing of
Effluent Water - AMHS Vessels
(Document link: John Pavitt)

John - ADEC regulates discharges from vessels in Alaska and thus they would be the most appropriate entity to answer Mr. Shankar's questions.
Mr. Albert Faure, ADEC can be reached at 907-465-5279 and his email is:
albert.faure@alaska.gov.

John
Pavitt/R10/USEPA/US

12/19/2007 10:10 AM

To
Tara Martich/R10/USEPA/US@EPA
cc
Kimberly Ogle/R10/USEPA/US@EPA
Subject
Fw: 07017 : Testing of Effluent
Water - AMHS Vessels

Re: discharge of wastewater from marine ferries.

Mr. Shankar was able to reach the Manchester Lab, and they sent him the attached literature regarding time delays on conducting fecal testing.
(How long may the sample sit before it's analyzed at the lab?)

Harbor Marine Group would like confirmation that their holding time does not exceed QA/QC requirements.

Thank you.

John Pavitt
US EPA, Region 10, Alaska Operations Office

(907) 271-3688

(907) 271-3424 (Fax)

----- Forwarded by John Pavitt/R10/USEPA/US on 12/19/2007 10:07 AM -----

"Ravi Shankar"
<rshankar@foss.com>

12/19/2007 09:42
AM

John Pavitt/R10/USEPA/US@EPA

To

cc

Subject
07017 : Testing of Effluent Water
- AMHS Vessels

John,

Reference to our telecon, enclosed is the document I have received from the EPA Regional Lab in Port Orchard. It appears that delayed testing for fecal coliform is an accepted procedure as described in section 9222E. Since the testing will be done in Alaska, I would appreciate if you can take a look at this prescribed practice and confirm that this is acceptable for Alaskan waters as well. Look forward to your response at your early convenience.

Best regards,

Ravi Shankar
Senior Project Manager
Harbor Marine Group
FOSS Maritime Co.
660 West Ewing St
Seattle, WA 98119
Tel : 206-270-4893(See attached file: Delayed Test Procedure for Total Coliform.pdf)
(See attached file: Delayed Test Procedure for Total Coliform.pdf)

Table 1: Effluent Limits and Discharge Reporting for Vessels That Discharge Into Marine Waters of the State (Class 1-SD, 2-SD, 3-SD, 1-CD, 2-CD, and 3-CD)

Effluent Characteristics	Minimum Value	Monthly Average	Daily Maximum	7 Day Average	Minimum Frequency	Sample Type
Total Flow (cubic meters per day of effluent)	N/A	N/A	Not to exceed design capacity Report	N/A	Daily	Metered or estimated
Biochemical Oxygen Demand (5-day)	N/A	30 mg/L ¹	60 mg/L ¹	N/A	Twice Monthly	Grab
Settable Solids	N/A	30 mg/L ¹	N/A	45 mg/L ¹	Twice Monthly	Grab
Fecal Coliform Bacteria	N/A	14 per 100 mL ^{1, 2, 3 & 4}	43 per 100 mL ¹	N/A	Twice Monthly	Grab
Total Residual Chlorine	N/A	N/A	0.0075 mg/L ^{1, 7}	N/A	Twice Monthly	Field test
Ammonia	N/A	N/A	20.0 ^{6, 8} mg/L	N/A	Twice Seasonally	Grab
Copper	N/A	N/A	0.0031 mg/L ^{5, 8}	N/A	Twice Seasonally	Grab
Lead	N/A	N/A	0.0081 mg/L ^{5, 8}	N/A	Twice Seasonally	Grab
Zinc	N/A	N/A	0.081 mg/L ^{5, 8}	N/A	Twice Seasonally	Grab
pH	6.5 S.U. ¹	N/A	8.5 S.U. ¹	N/A	Twice Monthly	Field test, grab, or continuous
Total Suspended Solids	N/A	N/A	150 mg/L ¹	N/A	Twice Monthly	Grab or Continuous
Conductivity	N/A	N/A	Report	N/A	Twice Seasonally	Field test, grab, or continuous
Chemical Oxygen Demand	N/A	N/A	Report	N/A	Twice Seasonally	Grab
Nitrate-Nitrogen (N-NO ₃)	N/A	N/A	Report	N/A	Twice Seasonally	Grab
Total phosphorus	N/A	N/A	Report	N/A	Twice Seasonally	Grab
Total Kjeldahl Nitrogen (TKN)	N/A	N/A	Report	N/A	Twice Seasonally	Grab
Total Organic Carbon	N/A	N/A	Report	N/A	Twice Seasonally	Grab

Base-Neutral Acid extractables (BNA)	N/A	N/A	Report	N/A	Twice Seasonally	Grab
Volatile Organic Compounds (VOCs)	N/A	N/A	Report	N/A	Twice Seasonally	Grab

Footnotes:

1. Milligrams per liter (mg/L); milliliter (mL); Standard Units (S.U.)
2. All effluent fecal coliform average results must be reported as the geometric mean
3. Not more than 10% of the samples may exceed this value
4. 30 day average is the average of all samples taken during the calendar month. If only one sample was collected, the result of that sample is the 30 day average.
5. Marine chronic values from Manual for Toxics and Other Deleterious Organic and Inorganic Substances.
- 6 Ammonia standards are based on temperature, pH and salinity. This standard is from Table IX in the Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances using a pH 7.8, salinity of 20 g/kg and temperature between 10-15 degrees Celsius. Large ships while stationary have a minimum dilution factor of 10. Ammonia results greater than 20 mg/L exceed water quality standards in the receiving water.
7. The Alaska Water Quality Standard, (see 18 AAC 70), limit is 0.0075 mg/L for total residual chlorine in marine water. The Department will use 0.100 mg/L (the minimum level for EPA Method 330.3 and Method 330.4) as the compliance evaluation level for this parameter. Daily maximum concentrations below 0.100 mg/l will be considered in compliance with the limitation. Testing for total residual chlorine is not required if chlorine is not used as disinfectant in the wastewater treatment works process.
8. See Section 1.11 of this permit.

- 1.7.3 Vessels that hold all their wastewater and discharge only outside of marine waters of the state are not required to determine effluent characteristics specified in either section 1.7.2.
- 1.7.4 Chemical disinfection of the wastewater effluent shall not occur without prior approval from the department.
- 1.7.5 There shall be no discharge of foam (in other than trace amounts), oily wastes (which produce a sheen on the surface of the receiving waters), floating solids, garbage or grease.
- 1.7.6 No other liquid wastes shall be discharged to the waters of the State unless otherwise approved by the Department.
- 1.7.7 Sediment and sludge that accumulates in tanks shall not be disposed of by discharging. Sediment and sludge must be disposed of at a facility approved by the Department for this purpose or in an alternative manner approved by the Department as well as in accordance with state and federal laws and requirements.
- 1.7.8 If the permittee monitors any effluent characteristic identified in this permit more frequently than required, the results of such monitoring shall be included in the

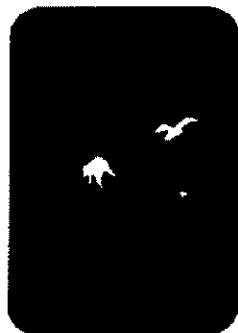
Appendix K

Best Management Practices (BMP) Plan

Best Management Practices (BMP) Plan
M/V Malaspina
BMP registration No. C0-014-2006

Approved: August 7, 2007

Prepared by the
Alaska Department of Environmental Conservation
CPVEC
2007



ALASKA
Department of
Environmental
Conservation

Package Contents

[Consisting of 4 (four) Sections as set out below]

- 1. Best Management Practice (BMP) Plan Application Form Approved by ADEC on August 7, 2007; 2 (two) pages.**
- 2. Best Management Plan Practice (BMP) Plan M/V Malaspina, BMP Registration No. C0-014-2006; Approval Date August 30, 2006; Revision 0. Total of 30 (thirty) pages (including the technical and supporting documents)¹.**
- 3. Best Management Plan Practice (BMP) Plan M/V Malaspina technical information:**
 - a. Copy of "MSD Operation Communication Procedures" for the "Malaspina" MSD system; 1 (one) page.**
 - b. Copy of Waste Water discharge log "Malaspina". Period August 30, 2005 (17:00) to September 30, 2005 (19:45)(example); 3 (three) pages.**
 - c. Copy of Chief Engineer's Weekly Summary "Malaspina", starting date April 30, 2006 (0001 hours) ending date May 6, 2006 (2400 hours) (example); 1 (one) page.**
 - d. Copy of monitor screen "AMOS-Malaspina/Engine-[History]"; overview MSD 1-814- Inspection, MSD Effluent, period 5/29/2006 to 12/19/2003 (example); 1 (one) page.**
- 4. Best Management Practice (BMP) supporting documentation:**
 - a. United States of America Department of Homeland Security United States Coast Guard "Certificate of Inspection" Vessel: Malaspina Certification Date: 17 April 2006; 4 (four) pages.**
 - b. Documentation: "Hydroxyl Marine Systems" onboard waste water treatment systems; 2 (two) sheets.**
 - c. Copy Letter Elliott Bay Design Group Ref. j05006-05L "M/V Columbia-Marine Sanitation Devise (MSD) installation" Dated: March 31, 2006; 1 (one) page².**

¹ Alaska Marine Highway system (AMHS) confirmed in August 2007 that the Conditional approved BMP plan (August 30, 2006) content remained unchanged for the Malaspina. The 2007 approved BMP includes the removal of the Conditional status.

² AMHS provided additional information in the BMP document that the Malaspina has similar space restrictions / limitations to install advanced waste water treatment compared to the Columbia.

BEST MANAGEMENT PRACTICE (BMP) PLAN APPLICATION FORM

Alaska law requires that owners or operators of a small (50 to 249 overnight passengers) commercial passenger vessel, register under the Commercial Passenger Vessel Environmental Compliance Program (CPVEC) and the vessel may not discharge wastewater in Alaska waters unless the vessel meets standard terms and conditions under Alaska Statute (AS) 46.03.462(b)¹, or alternative terms and conditions (AS 46.03.462(c)² or AS 46.03.462(e)). AS 46.03.462(e) covers vessels whose keel was laid before January 1, 2004, and allows operation under a Best Management Practices (BMP) Plan. BMPs include practices that protect the environment to the maximum extent feasible.

Standard terms and conditions and alternative terms and conditions under AS 46.03.462(b) and AS 46.03.462(c) were established in the original 2001 law establishing the CPVEC program. AS 46.03.462(e) became available through amendments to the CPVEC program law in 2004 (House Bill 522). Owners or Operators of small ships intending to operate under AS 46.03.462(e) must apply by **March 1** of each calendar year.

An owner or operator of a small commercial passenger vessel who intends to operate under a BMP plan must submit a best management practices plan as described in **18 AAC 69.046** for DEC approval. If an owner or operator of a small commercial passenger vessel operating under alternative terms and conditions under AS 46.03.462(e) fails to operate in accordance with an DEC approved BMP plan, the vessel discharges must meet the standard terms and conditions in AS 46.03.462(b).

If you have questions, please contact Albert Faure (albert.faure@alaska.gov) at (907) 465-5279.

Box for ADEC use only

X ☐

ADEC approved BMP Reg. No. **C0-014-2006**

on **8/7/2007**

expires 3 year after this date



¹ Requires wastewater concentration does not exceed a fecal coliform standard of 200 fecal coliform/100 ml and a total of suspended solids standard (TSS) of 150 mg/L AS 46.03.463.

² DEC may approve alternative terms and conditions if the vessel owner or operator cannot practicably comply with the standard terms and conditions of vessel discharges as set out AS 46.03.462(b). Provides equivalent environmental protection; grant additional time necessary to make agreed upon changes to the vessel to meet the standard terms and conditions; or test experimental technology that has a reasonable likelihood of success in providing increased environmental protection.

Please complete sections 1-5 of this application form.

1) Vessel Name: M/V Malaspina

2) Contact Information for Person responsible for implementing the BMP Plan

Responsible Person: Mark A. Perez

Electronic mail of the responsible person: mark_perez@dot.state.ak.us

Mailing Address: 7559 N. Tongass Highway, Ketchikan, Alaska 99901

Physical Address (if different from mailing address):

Telephone Number: 907-228-7264 Facsimile Number: 907-225-1514

(3) Date³ when the vessel keel was laid (attach supporting documentation); **05 Jan 1962**

(4) Certify in the box below that the vessel cannot practicably comply with the standard terms and conditions in AS 46.03.462(b) and attach supporting documentation.

I certify that **M/V Malaspina** (Vessel name) cannot practicably comply with the standard terms and conditions in Alaska Statute 46.03.462(b) because of

☒ Physical reasons.

OR

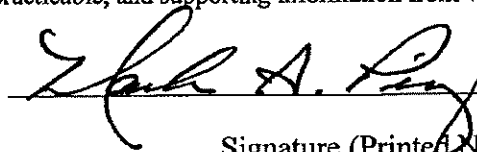
☒ Economic reasons.

I have attached documentation to support my statement above.

☒ letter signed by a naval architect, professional engineer, or classification society inspector stating that new or modified waste treatment systems that would produce sewage, graywater, or other wastewater that complies with the standard terms and conditions in AS 46.03.462(b) could not be installed without requiring additional stability testing or relicensing by the United States Coast Guard.

☒ statement from the vessel owner or operator that provides the estimated costs of installing new or modified waste treatment systems on the vessel that would produce sewage, graywater, or other wastewater that complies with the standard terms and conditions in AS 46.03.462(b), the reasons why those costs are not practicable, and supporting information from vendors.

By:



Signature (Printed Name)

(5) Attach best management practices plan that meets the requirements in 18 AAC 69.046(c).

³ Date must be prior January 1, 2004 to apply for alternative terms and conditions using a Best Management Practices Plan.



State of Alaska

**DEPARTMENT OF
TRANSPORATION AND
PUBLIC FACILTIEIS**



ALASKA MARINE HIGHWAY SYSTEM

BEST MANAGEMENT PLAN FOR THE OPERATION AND MAINTENANCE OF MARINE SANITATION DEVICES ON THE M/V *Malaspina*

June 12, 2006



OWNERS STATEMENT

The State of Alaska through the Department of Transportation and Public Facilities' Alaska Marine Highway System (AMHS) operates a fleet of 11 vessels, five of which are regulated by the Alaska Department of Environmental Conservation's Commercial Passenger Vessel Environmental Compliance Program. AMHS has been providing passenger and vehicle service since 1963. Three of the vessels (M/V *Matanuska*, M/V *Malaspina*, M/V *Taku*) started service in 1963. The other two, the M/V *Columbia* and the M/V *Kennicott*, began service in 1974 and 1998 respectively. While these vessels were state of the art at the time of their construction, the regulatory world they are currently operating in is much different. The requirements and capabilities of marine sanitation devices (MSDs) have changed dramatically in the last 40 years.

AMHS has upgraded its MSDs to be the Coast Guard approved Type II marine sanitation devices. The MSDs are not, however, capable of producing the effluent requirements of the State of Alaska's Commercial Passenger Vessel Environmental Compliance Program. AMHS's vessels were designed for simpler marine sanitation devices. Testing results have shown that these systems do not consistently meet the Type II USCG standards. There is not sufficient vertical space for the installation of newer "advanced" treatment systems that take up more space. Therefore, AMHS is researching to find systems that can physically fit on its vessels, meet USCG approval requirements, and meet the DEC advanced treatment criteria. AMHS waste water systems discharge frequently and have only collection tanks. There are no sewage holding tanks on any of the AMHS vessels.

AMHS vessels operate very differently from large and small cruise ships in that salt water is used to flush toilets. Fresh water is used for sinks, showers, and food preparation. Salt water makes the treatment and disinfection of sewage more complicated. There is no room on the vessels to increase the amount of freshwater storage to allow it to be used for flushing toilets.

It is estimated that the installation of advanced waste water treatment systems would cost more than 1 million dollars per vessel. Attachment #1 provides background on the system investigated for installation on the M/V *Tustumena*, a smaller vessel than the 5 vessels under the Passenger Vessel Environmental Compliance Program. AMHS is working within the budget process as well as with federal funding sources and requirements for improvements to current waste water systems and possible purchase of "advanced" MSD systems before year 2012.

AMHS attempted to install a Hydroxyl Unit (advanced ozone treatment) system in the *Tustumena* during overhaul period (Nov 05 to April 06). The engineer's estimate for this unit was \$994,928 of which 58% was material cost (Attachment #2). The unit was not installed because it had not yet received a Coast Guard approval plus the lead-time was 20 weeks.

AMHS later attempted to install a Hydroxyl Unit in the Columbia. In the design process, it was discovered that there was insufficient height available in the existing MSD space. Instead of designing for one MSD unit for the ship, it was found that the only arrangement that would fit would be 4 small units. When it was determined that the potable water tank would need to be reduced in size to make sufficient room for the 4 new MSD units, the project was deferred until there was time to properly research the correct MSD unit for our limitations.

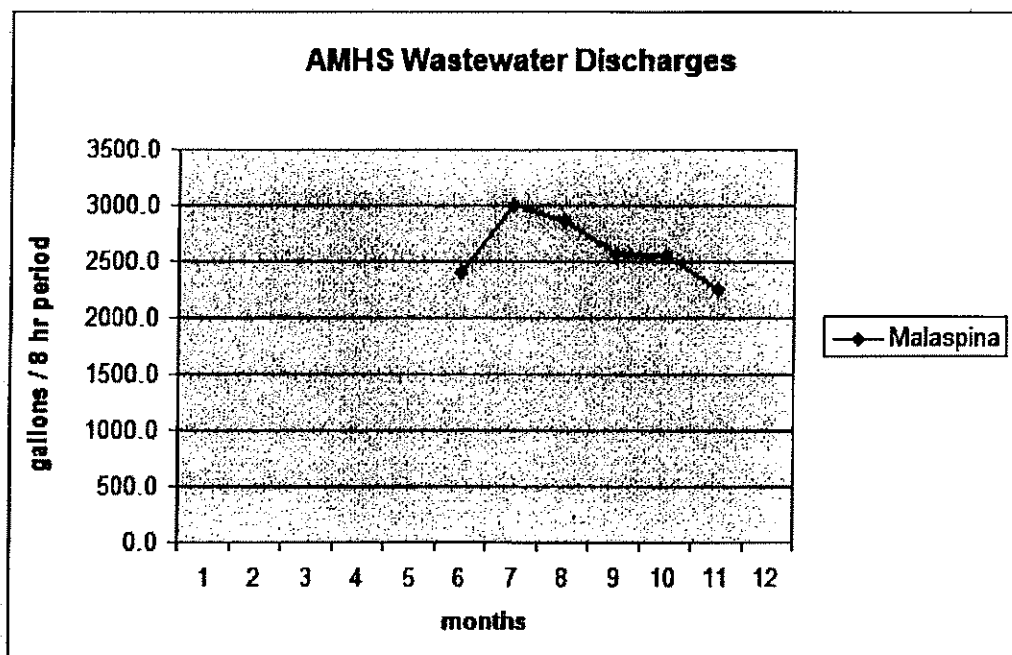
The Malaspina has similar space arrangements as the Columbia with restricted overhead space due to crew quarters located above the MSD room.

In summary, there is insufficient space for Hydroxyl Units on all the AMHS vessels under the DEC program as all have crew quarters above the existing MSD space. In addition the available advanced MSD units do not yet have USCG approvals.

CURRENT AND PAST DISCHARGE PRACTICES

The Malaspina combines all black water and gray water drains. The sewage is processed through a USCG approved maceration/chlorination treatment system. The 8-hour average volumes peak in July when the passenger traffic is at the peak. The July 8 hour average volume is 3,003 gallons / 8 hour period

When in operation, the Malaspina spends about 18% of time in port and 82% of time at sea.



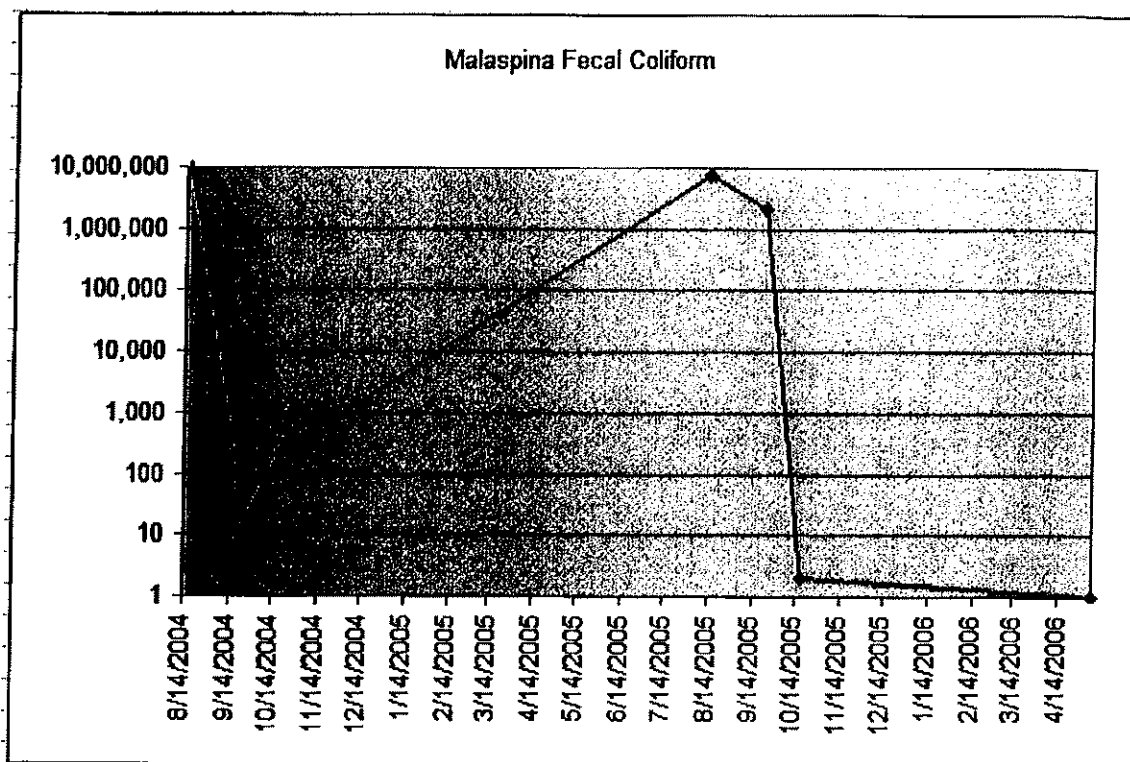
When operating, the AMHS vessels spend the majority of their time in Alaska as described below:

- The Bellingham run (Malaspina) operates in Alaska 60% of the time. The remainder of the time, she is still regulated by USCG, Washington State, and Canadian rules.
- For calendar year 2006, the operation schedule shows the Malaspina in operation for 6 months.

Summary of test results

On a fleet basis, the performance of the MSD units is directly related to the chlorine production during the treatment process. When the effluent has residual chlorine, the fecal coliform count is likely to be within limits. We will be focusing on this problem by having the ship's maintenance crew take daily free chlorine readings. Parameters other than chlorine and fecal coliform do not appear to be problem areas.

Vessel	Sample Date	Ammonia as N mg/L	pH, units	BOD, mg/L	COD, mg/L	TSS, mg/L	Total Cl, mg/L	Free Cl, mg/L	Fecal Coliforms, MPN/100ml	conductivity umhos/cm	TOC, mg/L	alkalinity, Total as CaCO3, mg/L	Total Nitrate & Nitrite as N, mg/L	Total Phosphorus, mg/L	TKM, mg/L	SS, mg/L
Malaspina	7/2/01	1.400	7.90	20.0	470.0	40.0	0.06	0.05	70,000	34,800						
Malaspina	6/26/02	10.10	7.0	89	876.0	100.0	n/a	4.00	5	28,300	n/a	n/a	n/a	n/a	n/a	n/a
Malaspina	7/9/02	0.12	7.9	1	514.0	22.9	3.60	2.50	1	23,800	6.0	62.3	0.5	0.35	0.8	0.1
Malaspina	9/6/02	8.90	7.2	94	220.0	66.6	0.05	0.00	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Malaspina	8/16/03	72	7.17	344	280	119	0	0	3,000,000	17,200	183	344	0	9.20	84	0
Malaspina	8/14/04	17.7	7.1	329	490	130	0.06	0.05	26,000,000	13,300	107	285	0.05	6	29.4	0.05
Malaspina	9/20/04	20.2	6.8	230	730	145	0.06	0.05	250	28,800	159	148	10		53	2.1
Malaspina	9/20/04	21	6.81	244	1200	120	0.06	0.05	10	28,500	408	153	9.8		52.6	2.3
Malaspina	10/21/04	20.2	6.8	230	730	146	ND	ND	250	28,800	159	148	10	2.8	53	2.1
Malaspina	8/13/05	61.2	7.03	412	1100	111	<1	<1	7,700,000	13,300	390	364	<8	9.9	79.8	0.1
Malaspina	9/21/05		7.22	301		82	<1	<1	2,200,000							
Malaspina	10/17/05		7.43	92.8		43.6	0.2	0.1	<2.6							
Malaspina	5/6/06	14.2	7.21	128	726	70.3	19	6.6	<2.0	30,300	66	122	<16	3.2	18.9	<1



BEST MANAGEMENT PRACTICES

MARINE SANITATION DEVICE COMPLIANCE PLAN

AMHS brought up manufacturers representatives in March 2006 to inspect the MSD units accompanied by Port Engineer Paul Johnsen. This inspection found that the MSDs are being operated correctly and the responsible engineer is knowledgeable and competent in overseeing its operation. The recommendations were:

- Inspect all of the orifice plates and replace with factory specified titanium plates.
- Check all valves on all 3 machines for leakage, replace as needed.
- Recalibrate volt and amp meters on all panels
- Change cleaning procedure - clean plates in place with a soft brush - do not remove the plates for cleaning.
- Inspect grounding targets for full function
- Replace the present book cells, control panels and associated piping with low salinity equipment.

AMHS will review these recommendations against the FY07 funding levels and will decide a course of action at the new budget year (July 1, 2006)



For training issues, what is suspected is that temporary relief engineers overseeing operations have taken too great a time period to become knowledgeable in all the operational and maintenance procedures.

To assist the relief engineers in learning the MSD system operation faster, AMHS has completed CAD line drawings of the waste water system and marked each valve on the drawing with a valve number that corresponds to the label attached to each valve. A laminated drawing is posted in the MSD room and available to all operators.

AHMS has developed policies to insure that the MSD units are properly monitored. Policy changes include:

- Daily testing of the waste water total chlorine reading.
- Instruction that crew must take action if chlorine readings are not in the range of 0 to 5 ppm.
- AMHS is requiring that if a zero reading is found that a 2nd reading must be taken within 24 hours. A second zero reading requires shipboard investigation and repairs to commence.
- If there are 3 days with zero readings the assigned port engineer and the port captain must be notified by email providing information on what steps are being taken to resolve the situation.
- If the effluent chlorine reading exceeds 5 ppm (mg/liter) the ship is instructed to take corrective action. This corrective action could be any of the below actions:
 - Reduce the flow rate of the chemical feed pump (if it is used)
 - Discontinue any double processing of waste water. (Some operators feel it is helpful to pump the V-2 processing tank back to the V-1 forward collection tank to help reduce the cellulose mat buildup in the V-2 tank.)
 - Discontinue use of chlorine bleach by staff cleaning rooms.
 - Contact manufacturer for troubleshooting advice.
- A follow-up email is required to both the port captain and the assigned port engineer when the problem is solved.

The chief engineer's reports are sent to AMHS headquarters with copies being sent to the vessel's respective port engineer, the port captain, and marine engineering manager. An administrative clerk will be responsible for posting these reports on a spreadsheet on a shared networked drive. This will allow AMHS management to easily ascertain that procedures are being followed and the residual chlorine levels are appropriate.

Additionally each vessel is required to keep the following documents in an accessible cabinet in the MSD room

- DEC Approved Best Management Plan
- Vessel Specific Sampling Plan
- MSD unit training records
- Quality Assurance/ Quality Control Plan
- MSD unit operation manual
- Line drawings of MSD system

AMHS has contracted with a Juneau engineering company, Electric Power Systems, to make a proposal to install a control system that will utilize the full volume of the existing collection tanks before discharge in port will occur. The concept being worked on is:

A three-position operation parameter selection switch will be installed.

1. Approximately 1 hr before port arrival all MSD units collection tanks will be brought down to 10% level
2. In Port the MSD systems will operate in normal mode with cut in 85% tank level and cut out 75% tank level.
3. At Sea the MSD will be operated with the normal cut in / cut out tank levels

We expect to have a proposal to implement these concepts in time for ordering parts on July 1, 2006. Installation of this system would not be feasible until the next overhaul period.

The AMHS long-term plan is to install MSD units that meet the advance water treatment standards by 2012.

AMHS does not transit areas that are designated as state refuges, state critical habitat areas, and state sanctuaries as defined in AS 16.20 nor do AMHS vessels transit within 100 meters horizontally of mean lower low water of tidally affected portions of waters identified as important for spawning or rearing of anadromous fish.

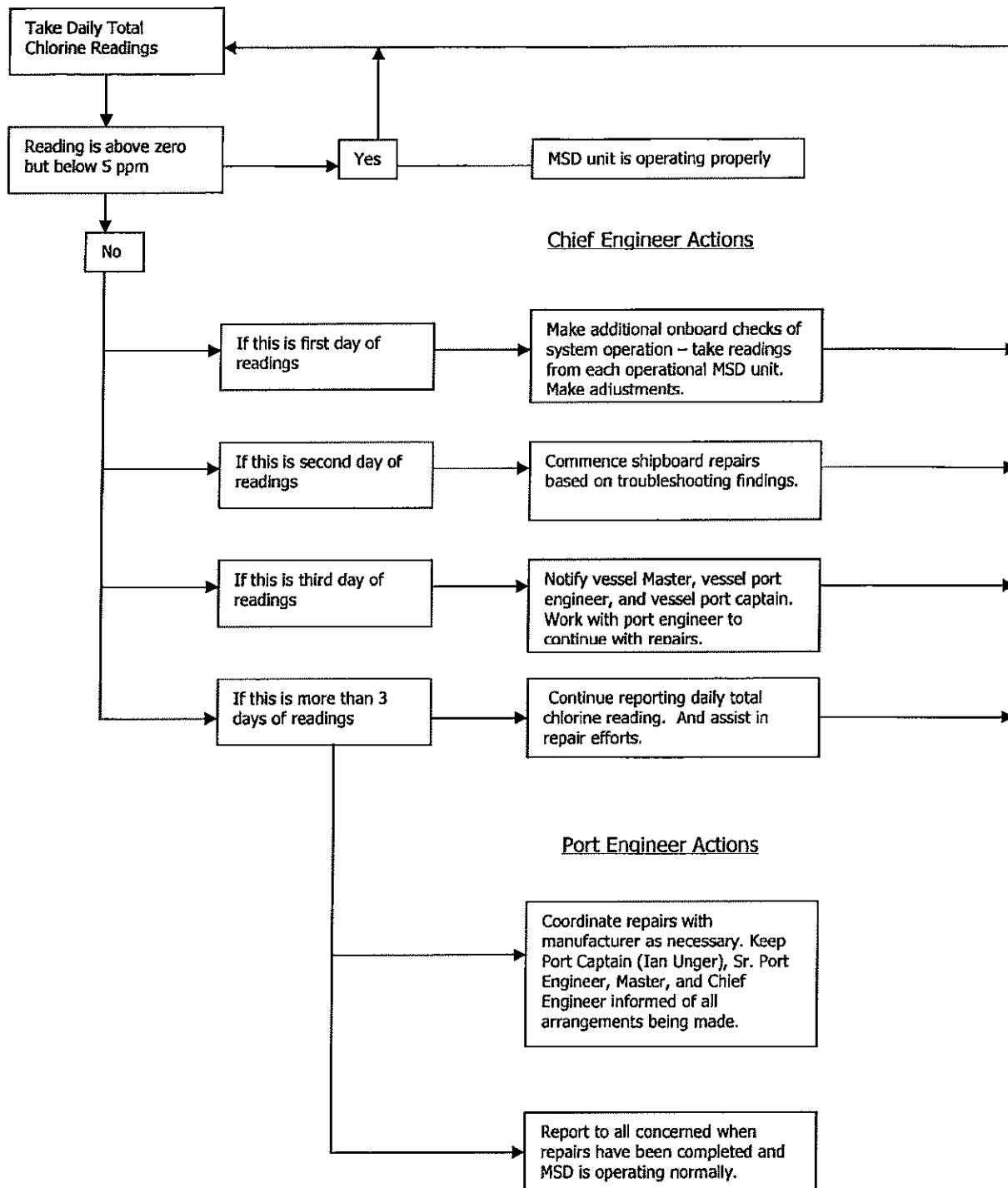
Communications Plan

AMHS has implemented the following communications procedures in order to insure that the proper operation of the MSD units on each ship is communicated to the ultimate decision makers.

- The port captain – (Ian Unger) is responsible for the fleet waste water program.
- The port captain will be working with the senior port engineer, (Mark Perez) with the goal of transferring the overall responsibility sometime in 2007.
- The assigned chief engineer is responsible for the shipboard waste water program.
- The chief engineer's weekly report requires tracking of the daily residual total chlorine level.
- The chief engineer's weekly report results will be tabulated and tracked by ship at headquarters
- Three days of zero chlorine residual require email communication with the assigned port engineer and the port captains office providing information on:
 - What the problem is
 - What is being done to correct it
 - Email notification when problem is resolved
- The master will be notified when the MSD is not operating properly.
- In August of every year, the chief engineers from each of the regulated vessels will prepare a memo to the assigned port engineer and the port captain's office describing recommendations for upgrades and changes that need to be made in order to increase compliance. This information will be used by the engineering manager and the general manager in developing the upcoming budget.

Training Plan

AMHS believes that the engineers operating our vessels are competent. It is recognized that relief engineers who are not as familiar with a specific vessel's system have had some difficulty in ensuring that MSDs are operated to their maximum efficiency. AMHS believes that the procedures put in place will alleviate this problem and that a structured training program is not necessary at this time. We are in the planning stages to implement a formal training program that could be available in 2007. If there are problems with specific relief engineers, we will address their competency on an individual basis. Until the formal training is available, the chief engineer is responsible for insuring that the MSD operating personnel have the knowledge necessary to operate the systems correctly. The chief engineer will conduct individual training as deemed necessary.



MSD Operation Communication Procedures



United States of America
Department of Homeland Security
United States Coast Guard

Certification Date: 17 Apr 2006
Expiration Date: 17 Apr 2007
IMO Number: 5218183

Certificate of Inspection

Vessel Name MALASPINA	Official Number 290288	Call Sign W16803	Service Passenger (Inspected)			
Hailing Port skagway AK	Hull Material Steel	Horsepower 8000	Propulsion Diesel Reduction			
Place Built SEATTLE WA	Delivery Date 03Aug1962	Date Keel Laid 05Jan1962	Gross Tons R-2928 I-9121	Net Tons R-1253 I-3667	DWT R-372.2 I-372.2	Length R-372.2 I-372.2
Owner STATE OF ALASKA DEPT OF TRANSPORTATION & PUBLIC FACILITIES 7559 NORTH TONGASS HIGHWAY KETCHIKAN, AK 99901-9101 UNITED STATES	Operator STATE OF ALASKA DEPT OF TRANSPORTATION & PUBLIC FACILITIES 7559 NORTH TONGASS HIGHWAY KETCHIKAN, AK 99901-9101 UNITED STATES					

This vessel must be manned with the following licensed and unlicensed personnel. Included in which there must be 26 certified lifeboatmen, 0 certified tankermen, 0 HSC type rating, and 4 GMDSS Operators.

0 Master	1 Master & 1st Class pilot	0 Radio Officer(s)	1 Chief Engineer	0 QMED/Rating
0 Chief Mate	0 Mate & 1st Class Pilot	4 Able Seamen/ROANW	0 1st Asst. Engr/2nd Engr.	2 Oilers
0 2nd Mate/OICNW	0 Lic. Mate/OICNW	2 Ordinary Seamen	0 2nd Asst. Engr/3rd Engr.	2 ASST
0 3rd Mate/OICNW	3 1st Class Pilot	0 Deckhands	0 3rd Asst. Engr.	1 PATROLMAN
			0 Lic. Engr.	

1 WIPER

In addition, this vessel may carry 499 passengers, 42 other persons in crew, 0 persons in addition to crew, and no others.
Total persons allowed: 558

Route Permitted and Conditions of Operation:

---Lakes, Bays, and Sounds---

THE SHELTERED WATERS OF THE WEST COAST OF NORTH AMERICA AS DEFINED IN 46 CFR 42.03-35, NOT ON AN INTERNATIONAL VOYAGE AS DEFINED BY SOLAS. THIS VESSEL IS EXEMPTED FROM THE CONSTRUCTION REQUIREMENTS FOR VESSELS ON AN INTERNATIONAL VOYAGE PER 46 CFR 70.05-10(d).

WHEN OPERATING FOR A PERIOD NOT EXCEEDING 12 HOURS IN A 24 HOUR PERIOD, VESSEL MANNING MAY BE REDUCED TO (1) MASTER 1ST CLASS PILOT, (1) 1ST CLASS PILOT, (1) LICENSED MATE, (2) ABLE SEAMAN, (1) ORDINARY SEAMAN, (1) CHIEF ENGINEER, (1) ASSISTANT ENGINEER AND (1) OILER. ANY OPERATIONS OF THE VESSEL OUTSIDE THE HOURS 0600-2200 WILL ALSO REQUIRE (1) PATROLMAN.

AN HOURLY PATROL OF THE VEHICLE DECK SHALL BE CONDUCTED IN ADDITION TO THE EVENING PATROLS

SEE NEXT PAGE FOR ADDITIONAL CERTIFICATE INFORMATION

With this Inspection for Certification having been completed at Ketchikan, AK, the Officer in Charge, Marine Inspection, Sector Juneau certified the vessel, in all respects, is in conformity with the applicable vessel inspection laws and the rules and regulations prescribed thereunder.

Annual/Periodic/Quarterly Reinspections			
Date	Zone	A/P/Q	Signature
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

This certificate issued by:

M.S. GUILLOREY, CAPT, USCG

Officer in Charge, Marine Inspection

Sector Juneau

Inspection Zone



Certificate of Inspection

Page 2 of 4

Certification Date:
17Apr2006

MALASPINA

REQUIRED BY 46 CFR 78.30-10.

THE VESSEL MAY TRANSPORT THOSE HAZARDOUS MATERIALS SPECIFIED IN DEPARTMENT OF TRANSPORTATION EXEMPTION LETTERS DOT-E 7465, DOT-E 7928 AND DOT-E 11232. THESE EXEMPTION LETTERS MUST REMAIN VALID AND COPIES SHALL BE CARRIED ABOARD THE VESSEL.

THE MASTER SHALL ENSURE THAT 4 PERSONS ON BOARD THE VESSEL ARE ASSIGNED AND QUALIFIED TO OPERATE EACH INSTALLED FAST RESCUE BOAT. THE MASTER SHALL ENSURE THAT THE RESCUE BOAT IS OPERATED WITH AT LEAST 2 PERSONS QUALIFIED IN ITS OPERATION.

---Hull Exams---

Exam Type	Next Exam	Last Exam	Prior Exam
Drydock	30Sep2007	24Mar2006	31May2005
Internal structure	30Sep2007	24Mar2006	31May2005

---Stability---

Letter	Approval Date /	Office/ MSC
Book	11Jul2003	
	19Mar2001	Office/ GMSC

---Inspection Status---

Fuel Tanks

Tank ID	Internal Examinations		
	Previous	Last	Next
#5 PORT DOUBLE BOTTOM			
	21May2001	27Mar2006	31Mar2011
#5 STBD DOUBLE BOTTOM			
	22May1999	21Apr2004	21Apr2009
#6 PORT DOUBLE BOTTOM			
	21May2001	27Mar2006	31Mar2011
#6 STBD DOUBLE BOTTOM			
	21May2001	27Mar2006	31Mar2011

Boilers/Steam Piping

Maximum Steam Pressure Allowed/150

Boiler/Piping ID	Hydro/Previous	Hydro/Last	Hydro/Next	Mounts	Mounts
				Opened	Removed
13673	12May2003	31May2005	12May2008	12May2003	12May2003
162.001/226	20May2000	31May2005	31May2008	12May2003	12May2003
162.001/226	21May2003	31May2005	21May2008	12May2003	12May2003

Boiler/Piping ID	Fireside			Waterside		
	Previous	Last	Next	Previous	Last	Next
13673	21May2003	31May2005	12May2008	12May2003	31May2005	12May2008
162.001/226	20May2000	31May2005	31May2008	12May2003	31May2005	12May2008
162.001/226	12May2003	31May2005	12May2008	12May2003	31May2005	12May2008

Pressure Vessels

Type	Location	Previous	Last	Next
Air Receiver	AUX MACH	22May1999	01May2004	01May2009



Certificate of Inspection

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Certification Date:
17Apr2006

MALASPINA

Air Receiver AUX MACH 22May1999 01May2004 01May2009

Tailshafts

Tailshaft ID	Date Drawn	Next Due Date
1	31May2005	31May2010
2	31May2005	31May2010

Lifesaving

Number of Davits/2

Lifeboat/Raft ID	Full Wgt Test	Light Wgt Test	Falls Rnwd	Falls End/End
2	18Apr2006	31May2005	22Apr2003	-
1	14Apr2006	31May2005	03Jun2004	-

---Lifesaving Equipment---

	Number	Persons		Required
Total Equipment for	575		Life Preservers (Adult)	613
Lifeboats (Total)	0	0	Life Preservers (Child)	50
Lifeboats (Port) *	0	0	Ring Buoys (Total)	12
Lifeboats (Starbd) *	0	0	With Lights *	4
Motor Lifeboats *	0	0	With Line Attached *	2
Lifeboats W/Radio *	0	0	Other *	6
Rescue Boats/Platforms	2	20	Immersion Suits	12
Inflatable Rafts	17	850	Portable Lifeboat Radios	4
Life Floats/Buoyant App	0	0	Equipped with EPIRB?	Yes
			(* included in totals)	

---Fire Fighting Equipment---

Number of Fireman Outfits/ 4

Number of Fire Pumps/ 3

Hose information

Qty	Diameter	Length
8	2.5	50
50	1.5	50
4	1.5	75
2	1.5	50
2	2.5	50

Fixed Extinguishing Systems

Capacity	Agent	Space Protected
2625	Carbon Dioxide	MAIN ENGINE ROOM
	Water Spray	CAR DECK
150	Carbon Dioxide	PAINT LOCKER
150	Carbon Dioxide	EMERG. GENERATOR ROOM
1275	Carbon Dioxide	AUX. ENGINE ROOM
25	Other	GALLEY

Fire Extinguishers - Hand portable and semi-portable

Qty	Class Type
20	A-II
20	B-II
1	B-III
1	B-V
2	C-II



Department of Homeland Security
United States Coast Guard

Certificate of Inspection

Page 4 of 4

Certification Date:
17Apr2006

MALASPINA

END

Hydroxyl MARINE SYSTEMS

ONBOARD WASTEWATER TREATMENT SYSTEMS

HYDROXYL
CLEANSEA®
sets the
standard
for marine
wastewater
treatment.



Innovative scientific advancements in treatment techniques and technology enable the marine industry to comply with stringent regulations while protecting the marine environment. Welcome to the new standard in marine wastewater treatment — **Hydroxyl CLEANSEA®**.

Developed specifically for marine applications, **Hydroxyl CLEANSEA®** is based on proven technology that has solved wastewater treatment challenges in other environments. **CLEANSEA®** represents leading-edge application of proven processes to meet the demands of onboard wastewater treatment and is rapidly becoming the solution of choice by cruise lines, naval and ferry fleets worldwide. IMO-certified, **CLEANSEA®** delivers beyond the requirements of existing regulatory standards to satisfy current and future discharge regulations, making this system an economical investment with a low Total Cost of Ownership (TCO).

Hydroxyl Systems has the technology and comprehensive services to overcome marine wastewater treatment challenges today

Royal Caribbean's Vision of the Seas is compliant with worldwide environmental regulations by its use of **Hydroxyl CLEANSEA®** for wastewater treatment.

TREATMENT CAPABILITIES

Utilizing patent-pending solutions such as Advanced Oxidation Technologies (AOT), **CLEANSEA®** efficiently and cost-effectively treats a wide range of marine wastewater, including:

- blackwater
- galley, laundry and accommodation greywater
- oily bilgewater

The resulting effluent is clear, odorless and fully-disinfected, supporting and surpassing the parameters governing Alaska's stringent wastewater discharge regulations. **CLEANSEA®** enables discharge even in protected and embayed areas with minimal flushing action and even while anchored or docked.

CLEANSEA® also includes a complete solids management system to enable complete autonomy when dealing with marine wastewater. A highly efficient sludge dewatering and drying process delivers sludge residue that can be fully incinerated or landed to shore.



The British Columbia Ferry Corporation solves wastewater treatment challenges with **Hydroxyl CLEANSEA®**

FEATURES

Hydroxyl CLEANSEA® is unique.

- Simple, robust approach optimizes wastewater treatment efficiency
- Compact design utilizes less space than traditional systems
- Ease of installation while ships are dry-docked or at sea
- Easy to use and fully automated, **Hydroxyl CLEANSEA®** can be maintained by the ship's crew
- To maximize effectiveness, **Hydroxyl CLEANSEA®** employs either bio-oxidation processes using **Hydroxyl-PAC** media or pure oxidation processes
- No filters, membranes or chlorine minimizes operating costs and improves environmental protection
- Complete sludge management system
- Independently verified performance surpasses standards set by IMO, Alaska, and USCG regulations

Hydroxyl CLEANSEA® supports a wide range of marine wastewater treatment requirements, from 1 m³/day to over 1,000 m³/day.

A typical skid-mounted system capable of treating 75 m³/day generally,

- Occupies a footprint of less than 20 m²
- Weighs 9 tonnes dry
- Weighs 30 tonnes wet
- Utilizes less than 30 kWh of power

Smaller models are ideal for large yachts, while mobile containerized units are available for use on barges and in harbors.

Advanced Water Treatment Solutions

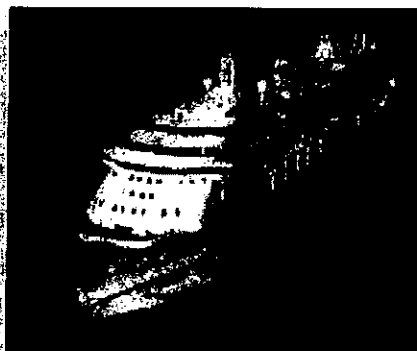
PROCESS DESCRIPTION

Hydroxyl CLEANSEA® treatment technology

Hydroxyl CLEANSEA® is based on a suite of processes and proven technology that has withstood the rigors of wastewater treatment in industrial, municipal and domestic applications. It is well suited to the unique demands of marine wastewater treatment.

A fully-automated system, CLEANSEA® delivers worry-free operation for ship crews. The system consistently delivers high-quality effluent that can be safely discharged into marine environments without the need of filters, membranes or hazardous chemicals. The CLEANSEA® oxidation process is impervious to changes in temperature and salinity and manages changes in flow and loading effortlessly.

Every CLEANSEA® system employs patent-pending technologies developed by Hydroxyl Systems, regardless of whether they are pure oxidation or bio-oxidation based processes.



Hydroxyl CLEANSEA® systems enable cruise lines to protect people and the sea

CLEANSEA® STATISTICS

	IMO	Alaska	CLEANSEA®
BOD (mg/l)	60	30	<30
TSS (mg/l)	50	30	<30
Pearl Column (MPN/100ml)	250	20	<2

Pure Oxidation

Hydroxyl CLEANSEA® pure oxidation processes employ advanced treatment techniques and technology including Positive Flotation Mechanism (PFM) and Advanced Oxidation Processes (AOP). Hydroxyl's pure oxidation technique uses hydroxyl radicals to effectively break down organic and inorganic compounds to purify wastewater. These systems are capable of using saltwater flushing systems.



A Pure Oxidation CLEANSEA® system is comprised of three main system components:

- Primary solids separation/oxidation tank
- Secondary oxidation/disinfection tank
- Controls and oxidant generation equipment

These components are assembled as standard skid mounted systems for easy installation or can be supplied in sections to allow refit of existing systems.

Bio-Oxidation

Hydroxyl CLEANSEA® bio-oxidation processes employ a combination of pure oxidation treatments plus a unique biological process. Specialized pellets, Hydroxyl-PAC media, establish a favorable bacterial growth environment. These bacteria actively consume organic matter. Final processing with hydroxyl radicals in the AOT stage results in effluent supersaturated with oxygen that is actually beneficial to the environment.

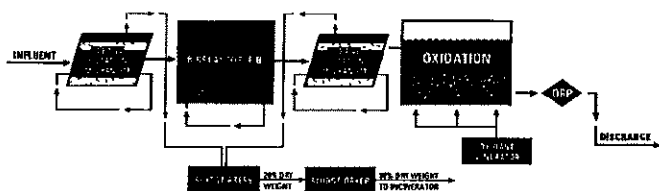
Further treatment is applied to the solids stream. A simple dewatering system receives the separated solids, processing them to a concentrated sludge. These solids proceed to a dryer that provides further dewatering. The dry residue can then be fed directly into the vessel's incinerator.

A Bio-Oxidation CLEANSEA® system is comprised of six main system components:

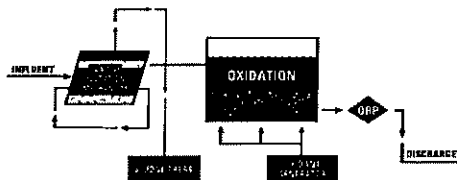
- Primary PFM solids separation/oxidation tank
- Bioreactors
- Secondary PFM solids separation
- Oxidation/disinfection tank
- Controls and oxidant generation equipment
- Sludge dewatering and drying equipment



Hydroxyl Marine Systems designs, manufactures and installs Hydroxyl CLEANSEA® — the future of Marine Sanitation Devices. Certified by the International Maritime Organisation (IMO), these innovative pollution prevention systems set a new standard for the marine industry.

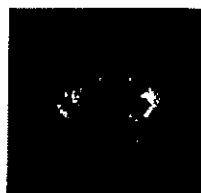


Typical Hydroxyl CLEANSEA® bio-oxidation system



Typical Hydroxyl CLEANSEA® pure oxidation system

ADVANCED
WATER TREATMENT
SOLUTIONS



Hydroxyl SYSTEMS

9800 McDonald Park Road, Sidney, BC, Canada V8L 5W5
Tel 1-888-655-3348 or 1-250-655-3348, Fax 250-655-3349
email: hydroxyl@hydroxyl.com website: www.hydroxyl.com
REGIONAL OFFICES THROUGHOUT NORTH AMERICA



Architectural & Engineering Services for the Marine Industry

5305 Skilshole Ave. NW

Suite 100

Seattle, WA 98107-4021

tel 206.782.3082

fax 206.782.3449

www.ebdg.com

March 31, 2006

Ref: j05006-05L

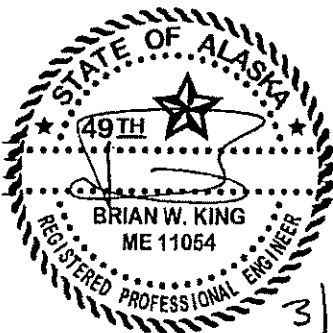
Mr. Paul Johnson
Alaska Marine Highway
State of Alaska, Department of Transportation
7559 North Tongass Avenue
Ketchikan, AK 99901

Subject: **M/V COLUMBIA – Marine Sanitation Devise (MSD) Installation**

Dear Mr. Johnson:

In accordance with your request, the following is a summary of our findings regarding the impact of installing an advanced MSD system to replace the existing MSD installation. This letter is intended to support your application for the "Best Management Practices Program".

The M/V COLUMBIA has a current booking capacity of 625 passengers plus 64 crew (689 total persons). We have determined that with the removal of the current MSD system along with its supporting settling and surge tanks and with the removal of two potable water tanks of approximately 13,400 gallons, there will be sufficient space for the installation of an advanced MSD system (four Hydroxyl BCM-25 units) providing a total nominal capacity to process 26,000 gallons of black and gray water per day. This nominal processing capacity is insufficient for the current capacity of 689 persons. The number of persons on board would need to be limited to approximately 500 if the advanced MSD systems were installed. The cost of installation of the advanced MSD system is estimated at \$2,553,000.



3/31/06

Appendix L

Chief Engineer Weekly Reports

Chief Engineer's Weekly Summary

Starting Date 1-6-08 at 0001 hours
Ending Date 1-12-08 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	128	Hr	99542	Hr		gal	100			gal/hr	0.78	gal/hr
Std. Main Engine	133	Hr	100647	Hr			130	gal		gal/hr	0.98	gal/hr
Generator #1	168	Hr	59561	Hr				gal		gal/hr		gal/hr
Generator #2	151	Hr	54871	Hr		gal		gal		gal/hr		gal/hr
Generator #3	19	Hr	57485	Hr				gal		gal/hr		gal/hr
Boiler	47	Hr	40475	Hr		gal				gal/hr		

Miles this week: 2036

| Avg. Kts./Hr. : 15.31

| Gal/Kt. Mi.: 17.8

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water	
Received													
Date	1-6	Place	KTN		gal		gal		gal		gal	4	gal
Date	1-8	Place	SIT		gal		gal		gal		gal	4	gal
Date	1-9	Place	KTN		gal		gal		gal		gal		gal
Date	1-11	Place	BELL	37140	gal		gal		gal		gal	3	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal		gal
On Hand 1 st Week				112710	gal	2270	gal	538	gal	5001	gal	100	gal
Total				149850	gal		gal		gal		gal	111	gal
Generated											312	gal	
Sent Ashore					gal		gal		gal	1360	gal		
On Hand End Week				113659	gal	2080	gal	538	gal	3953	gal	100	gal
Consumed				36191	gal	190	gal	0	gal			11	gal

MSD CI Content: 1-6 1-7 1-8 1-9 1-10 1-11 1-12

Total: 3.5 3.5 3.5 3.5 3.5 3.5 3.5

Free: 0.9 3.0 3.5 3.5 0.2 1.5 0.3

After observing that the jacket water temp. for our SME outboard turbo was higher than normal we changed and inspected the oil for both turbos while in Bellingham. The oil for the exhaust side bearing for both turbos was dark with an abnormal odor. As a precaution we decided to change these bearings resulting in a three hour delay in departure. The cause of the damaged oil has not been determined. Visual inspection of the bearings was inconclusive.

Work is continuing on the P.A. renewal

Equipment Failure

Yes ☐ No ☒

(If "YES" include Report)

Chief Engineer's Weekly Summary

Starting Date 12-30-07 at 0001 hours
Ending Date 01-05-08 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	136	Hr	99414	Hr		gal	60	gal		gal/hr	.44	gal/hr
Stbd. Main Engine	136	Hr	100514	Hr			120	gal		gal/hr	.88	gal/hr
Generator #1	166	Hr	59393	Hr				gal		gal/hr		gal/hr
Generator #2	162	Hr	54720	Hr		gal		gal		gal/hr		gal/hr
Generator #3	22	Hr	57466	Hr				gal		gal/hr		gal/hr
Boiler	45	Hr	40428	Hr		gal				gal/hr		

Miles this week: 2036 | Avg. Kts./Hr. : 14.97 | Gal/Kt. Mi.: 18.39

Liquid Status U S GALLONS				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X 1000	
Received													
Date	12-30	Place	KTN		gal		gal		gal		gal	3	gal
Date	1-1	Place	SIT		gal		gal		gal		gal	4	gal
Date	1-2	Place	KTN		gal		gal		gal		gal	1	gal
Date	1-4	Place	BELL	36615	gal	500	gal		gal		gal	2	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				36615	gal	500	gal		gal		gal	10	gal
On Hand 1 st Week				113542	gal	2006	gal	543	gal	3007	gal	102	gal
Total				150157	gal	2506	gal	543	gal	3007	gal	112	gal
Generated										1994	gal		
Sent Ashore & via OWS				0	gal	0	gal	0	gal	0	gal		
On Hand End Week				112710	gal	2270	gal	538	gal	5001	gal	100	gal
Consumed				37447	gal	236	gal	5	gal			12	gal

COMMENTS Grant Cooper from SND Communications aboard at Bellingham to make repairs on PA system. He will be back some day when he finds the part he needs to finish the job.

CL- 12-31 1-1 1-2 1-3 1-4 1-5
total mg/l 3.5 3.5 3.5 3.5 3.5 3.5
free mg/l 1.7 1.5 2.5 2.5 .8 3.5

Equipment Failure—No

Frank Czuba Chief Engineer

Chief Engineer's Weekly Summary

Starting Date 12-23-07 at 0001 hours
Ending Date 12-29-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	141	Hr	99284	Hr		gal	90	gal		gal/hr	.64	gal/hr
Stbd. Main Engine	141	Hr	100378	Hr			110	gal		gal/hr	.78	gal/hr
Generator #1	162	Hr	59227	Hr				gal		gal/hr		gal/hr
Generator #2	165	Hr	54558	Hr		gal		gal		gal/hr		gal/hr
Generator #3	28	Hr	57444	Hr				gal		gal/hr		gal/hr
Boiler	42	Hr	40383	Hr		gal				gal/hr		

Miles this week: 2036 | Avg. Kts/Hr. : 14.44 | Gal/Kt. Mi.: 18.6

Liquid Status U S GALLONS				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X 1000	
Received													
Date	12/23	Place	KTN		gal		gal		gal		gal	5	gal
Date	12/25	Place	SIT		gal		gal		gal		gal	3	gal
Date	12/28	Place	BELL	36710	gal		gal	112	gal		gal	2	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				36710	gal		gal	112	gal		gal	10	gal
On Hand 1 st Week				114737	gal	2094	gal	533	gal	4613	gal	101	gal
Total				151447	gal	2094	gal	645	gal	4613	gal	111	gal
Generated										1718	gal		
Sent Ashore & via OWS				0	gal	0	gal	0	gal	3314	gal		
On Hand End Week				113542	gal	2006	gal	543	gal	3007	gal	102	gal
Consumed				37905	gal	88	gal	102	gal			9	gal

COMMENTS. CI- 12-23 12-24 12-25 12-26 12-27 12-28 12-29

TOTAL MG/L 3.5 3.5 3.5 3.5 3.5 3.5

FREE MG/L 2.0 1.6 2.0 2.0 .5 3.5

EQUIPMENT FAILURE YES NO X If yes include report

Ian from Thyssen Krupp Elevator of Seattle repaired the passenger elevator doors during our stay in Bellingham..

Grant Cooper from SND Communication aboard at Bellingham to start component replacement on PA system.

Frank Czuba Chief Engineer

Chief Engineer's Weekly Summary

Starting Date 12-16-07 at 0001 hours
Ending Date 12-22-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	132	Hr	99143	Hr		gal	90	gal		gal/hr	0.68	gal/hr
Stbd. Main Engine	132	Hr	100237	Hr			120	gal		gal/hr	0.91	gal/hr
Generator #1	161	Hr	59065	Hr				gal		gal/hr		gal/hr
Generator #2	158	Hr	54393	Hr		gal	5	gal		gal/hr		gal/hr
Generator #3	26	Hr	57416	Hr				gal		gal/hr		gal/hr
Boiler	59	Hr	40341	Hr		gal				gal/hr		

Miles this week: 2036 | Avg. Kts/Hr. : 15.4 | Gal/Kt. Mi.:18.2

Liquid Status U S GALLONS				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X 1000	
Received													
Date	12-16	Place	KTN		gal		gal		gal		gal	4	gal
Date	12-18	Place	SIT		gal		gal		gal		gal	5	gal
Date	12-19	Place	KTN		gal		gal		gal		gal	3	gal
Date	12-21	Place	BELL	36820	gal		gal		gal		gal	5	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal		gal
On Hand 1 st Week				114917	gal	2199	gal	528	gal	4228	gal	101	gal
Total				151737	gal		gal		gal		gal	118	gal
Generated										855	gal		
Sent Ashore & via OWS					gal		gal		gal	660	gal		
On Hand End Week				114737	gal	2054	gal	525	gal	4423	gal	101	gal
Consumed				37000	gal	145	gal		gal			17	gal

Yes ☒ No ☐

In Bellingham after running the E-Gen the auto transfer would not return the E- load to the main bus. We were troubleshooting the transfer switch when it closed on its own. The problem will be intermittent and hard to find, however the equit. Is old and needs to be replaced (If "YES" include Report)

We are starting to show cam wear that I feel is abnormal It is happening to all four cams and should Be monitored closely

Chief Engineer Ray Justice

COMMENTS. CI-	12-16	12-17	12-18	12-19	12-20	12-21	12-22
TOTAL MG/L	3.5	3.5	3.5	3.5	3.5	3.0	3.5
FREE MG/L	0.3	1.8	1.3	1.5	1.5	0.5	1.5

Chief Engineer's Weekly Summary

Starting Date 12-9-07 at 0001 hours
Ending Date 12-15-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours		Consumption		Rate	
	End week	Grand Total	Fuel Oil	Lube Oil	Fuel Oil	Lube Oil
Port Main Engine	133 Hr	99011 Hr	gal	gal	gal/hr	gal/hr
Stbd. Main Engine	136 Hr	100105 Hr		gal	gal/hr	gal/hr
Generator #1	153 Hr	58904 Hr		gal	gal/hr	gal/hr
Generator #2	153 Hr	54235 Hr	gal	gal	gal/hr	gal/hr
Generator #3	40 Hr	57390 Hr		gal	gal/hr	gal/hr
Boiler	32 Hr	40282 Hr	gal		gal/hr	

Miles this week: 2036 | Avg. Kt.s/Hr. : 14.9 | Gal/Kt. Mi.: 19.1

Liquid Status U S GALLONS				FUEL (By Sounding)	Main Eng Lube	Aux Eng Lube	Oily Waste	Potable Water X 1000
Received								
Date	12-9	Place	KTN	gal	gal	gal	gal	gal
Date	12-11	Place	SIT	gal	gal	gal	gal	gal
Date	12-12	Place	KTN	gal	gal	gal	gal	gal
Date	12-14	Place	BELL	37552 gal	621 gal	165 gal	gal	5 gal
Date		Place		gal	gal	gal	gal	gal
Date		Place		gal	gal	gal	gal	gal
Total Received (Meter)				gal	gal	gal	gal	gal
On Hand 1 st Week				116269 gal	1718 gal	377 gal	3018 gal	99 gal
Total				153821 gal	2339 gal	542 gal	gal	117 gal
Generated							1210 gal	
Sent Ashore & via OWS				0 gal	0 gal	0 gal	0 gal	
On Hand End Week				114917 gal	2199 gal	528 gal	4228 gal	101 gal
Consumed				38904 gal	140 gal	14 gal	gal	16 gal

COMMENTS. CI- 12-9 12-10 12-11 12-12 12-13 12-14 12-15
TOTAL MG/L 3.5 3.5 3.5 3.5 3.5 0.9 3.5
FREE MG/L 0.3 3.5 0 0.1 1.5 0 3.5

The P.A. is still operating although crippled. A representative was by the vessel in Bell. Fri. to determine the necessary equipment to bring this system up to date.

Equipment Failure

Yes

☐
☐

No

☒
☐

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 12-02-07 at 0001 hours
Ending Date 12-08-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	135	Hr	98,878	Hr		gal	60	gal		gal/hr	.44	gal/hr
Sthd. Main Engine	135	Hr	99,969	Hr			90	gal		gal/hr	.66	gal/hr
Generator #1	161	Hr	58,751	Hr				gal		gal/hr		gal/hr
Generator #2	153	Hr	54,082	Hr		gal		gal		gal/hr		gal/hr
Generator #3	33	Hr	57,350	Hr				gal		gal/hr		gal/hr
Boiler	101	Hr	40,250	Hr		gal				gal/hr		

Miles this week: 2036 | Avg. Kts./Hr. : 15.08 | Gal/Kt. Mi.: 17.07

Liquid Status U S GALLONS				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X 1000	
Received													
Date	12/2	Place	KTN		gal		gal		gal		gal	3	gal
Date	12/4	Place	SITKA		gal		gal		gal		gal	7.5	gal
Date	12/5	Place	KTN		gal		gal		gal		gal	1.5	gal
Date	12/7	Place	BEL	37,930	gal		gal		gal		gal	5	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				37,930	gal		gal		gal		gal	17	gal
On Hand 1 st Week				113,094	gal	2,006	gal	377	gal	3,553	gal	101	gal
Total				151,024	gal	2,006	gal	377	gal	3,553	gal	118	gal
Generated										365	gal		
Sent Ashore & via OWS				0	gal	0	gal	0	gal	900	gal		
On Hand End Week				116,269	gal	1,718	gal	377	gal	3,018	gal	99	gal
Consumed				34,755	gal	288	gal	0	gal			19	gal

COMMENTS. CI-	12/2	12/3	12/4	12/5	12/6	12/7	12/8
TOTAL MG/L	3.5	3.5	3.5	3.5	3.5	3.5	3.5
FREE MG/L	2.0	0.5	0.5	1.5	3.5	2.2	3.5

PARTIAL FAILURE OF P.A. SYSTEM. FAIRHAVEN SHIPYARD CAME ABOARD IN BELLINGHAM AND FOUND A SECTION OF THE PRE-AMP BURNED OUT AND A MATRIX NETWORK PARTIALLY INOPERATIVE. WE ARE ABLE TO USE THE SYSTEM HOPEFULLY UNTIL THE YARD PERIOD. RAIN COUNTRY REFRIGERATION WAS HERE TO PLAN POSSIBLE AIR CONDITIONING OF THE GYRO ROOM.

Equipment Failure Yes ☒ No ☐
(If "YES" include Report)

Chief Engineer FRANK CZUBA

Chief Engineer's Weekly Summary

Starting Date 9-02-07

at 0001 hours

Ending Date 9-08-07

at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	129	Hr	97,119	Hr		gal	70	gal		gal/hr	.54	gal/hr
Stbd. Main Engine	135	Hr	98,208	Hr			120	gal		gal/hr	.89	gal/hr
Generator #1	162	Hr	57,030	Hr				gal		gal/hr		gal/hr
Generator #2	168	Hr	52,697	Hr		gal		gal		gal/hr		gal/hr
Generator #3	22	Hr	56,062	Hr				gal		gal/hr		gal/hr
Boiler	30	Hr	39,673	Hr		gal				gal/hr		

Miles this week: 2065

| Avg. Kts./Hr. : 15.3

| Gal/Kt. Mi.: 17.24

Liquid Status US GALLONS				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X 1000	
Received													
Date	9/2	Place	KTN		gal		gal		gal		gal	3	gal
Date	9/4	Place	BELHM	36,572	gal		gal		gal		gal	5.2	gal
Date	9/6	Place	KTN		gal		gal		gal		gal	5	gal
Date	9/7	Place	SIT		gal		gal		gal		gal	3	gal
Date	9/8	Place	A-BAY		gal		gal		gal		gal	3	gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				36,572	gal	0	gal	0	gal	0	gal	19.2	gal
On Hand 1 st Week				98,003	gal	1,718	gal	416	gal	4,215	gal	100	gal
Total				134,575	gal	1,718	gal	416	gal	4,215	gal	119.2	gal
Generated											686	gal	
Sent Ashore & via OWS				0	gal	0	gal	0	gal	800	gal		
On Hand End Week				98,967	gal	1,465	gal	416	gal	4,101	gal	100	gal
Consumed				35,608	gal	253	gal	0	gal			19.2	gal

COMMENTS. CI- 9/2 9/3 9/4 9/5 9/6 9/7 9/8

TOTAL MG/L 3.0 3.5 3.5 .8 .4 3.5

FREE MG/L 1.2 .8 .8 .0 .0 3.5

Awaiting parts for worn salt water service pump. Pump in service is holding up so far. We are putting together a spare M. E. lube oil pump using parts from Bellingham warehouse and what we had on hand.

Equipment Failure

Yes

☐

No

☒

(If "YES" include Report)

Chief Engineer Frank Czuba

Chief Engineer's Weekly Summary

Starting Date 8-26-07 at 0001 hours

Ending Date 9-01-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	129	Hr	96,990	Hr		gal	120	gal		gal/hr	1.075	gal/hr
Stbd. Main Engine	126	Hr	98,073	Hr			160	gal		gal/hr	1.27	gal/hr
Generator #1	160	Hr	56,868	Hr				gal		gal/hr		gal/hr
Generator #2	141	Hr	52,529	Hr		gal		gal		gal/hr		gal/hr
Generator #3	50	Hr	56,040	Hr				gal		gal/hr		gal/hr
Boiler	24	Hr	39,643	Hr		gal				gal/hr		

Miles this week: 2081

| Avg. Kts./Hr. : 16.13

| Gal/Kt. Mi.: 16.6

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X 1000	
Received													
Date	8-26	Place	KTN		gal		gal		gal		gal	6	gal
Date	8-28	Place	BELHM	34,740	gal		gal	48	gal		gal	7	gal
Date	8-30	Place	KTN		gal		gal		gal		gal	5	gal
Date	8-31	Place	SIT		gal		gal		gal		gal	7	gal
Date	9-1	Place	A-BAY		gal		gal		gal		gal	3	gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal	28	gal
On Hand 1 st Week				97,842	gal	1,948	gal	368	gal	3,744	gal	100	gal
Total				132,582	gal	1,948	gal	416	gal	3,744	gal	128	gal
Generated										471	gal		
Sent Ashore & via OWS				0	gal	0	gal	0	gal	0	gal		
On Hand End Week				98,003	gal	1,718	gal	416	gal	4,215	gal	100	gal
Consumed				34,579	gal	230	gal	0	gal			28	gal

COMMENTS. CI- 8-27 8-28 8-30 8-31

TOTAL MG/L 0 0 .5 1.0

FREE MG/L 0 0 .1 .2

Replaced emergency generator starter with our onboard 32 volt spare. Starter that was removed was stamped 24 volts. Will drop it off at Bellingham warehouse so it can be sent out for repair. We had a medical emergency onboard and rushed to Kake where we were able to use the ramp only because we had the Le Conte's ramp control onboard. We should have a ramp controller of our own onboard in case we need to stop at Kake in the future.

Equipment Failure Yes ☒ No ☐
(If "YES" include Report)

Chief Engineer Frank Czuba

Chief Engineer's Weekly Summary

Starting Date 8-19-07 at 0001 hours
Ending Date 8-25-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	135	Hr	96861	Hr		gal	60	gal		gal/hr	0.44.	gal/hr
Stbd. Main Engine	135	Hr	97947	Hr			150	gal		gal/hr	1.11	gal/hr
Generator #1	161	Hr	56708	Hr				gal		gal/hr		gal/hr
Generator #2	24	Hr	52388	Hr		gal		gal		gal/hr		gal/hr
Generator #3	161	Hr	55990	Hr				gal		gal/hr		gal/hr
Boiler	16	Hr	39619	Hr		gal				gal/hr		

Miles this week: 2065

| Avg. Kt.s/Hr. : 15.3

| Gal/Kt. Mi.: 17

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X1000	
Received													
Date	8-19	Place	KTN		gal		gal		gal		gal	4	gal
Date	9-21	Place	BELL	35110	gal		gal	190	gal		gal	7	gal
Date	8-23	Place	KTN		gal		gal		gal		gal	6	gal
Date	8-24	Place	ABAY		gal		gal		gal		gal	9	gal
Date	8-25	Place	ABAY		gal		gal		gal		gal	8	gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal		gal
On Hand 1 st Week				99842	gal	2094	gal	305	gal	4009	gal	102	gal
Total				134952	gal		gal	495	gal		gal	136	gal
Generated										1254	gal		
Sent Ashore & via OWS				0	gal	0	gal		gal	1519	gal		
On Hand End Week				99842	gal	1948	gal	368	gal	3744	gal	100	gal
Consumed				35110	gal	146	gal	127	gal		gal	36	gal

COMMENTS. CI-	8-19	8-20	8-21	8-22	8-23	8-24	8-25
TOTAL MG/L	3.0	3.5	3.0	0	0.9	3.5	3.0
FREE	0.5	3.5	0.5	0	0	0.3	0.5

Securing MSD's in port

Equipment Failure Yes ☐ No ☒
 (If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 8-12-07 at 0001 hours
Ending Date 8-18-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours		Consumption		Rate	
	End week	Grand Total	Fuel Oil	Lube Oil	Fuel Oil	Lube Oil
Port Main Engine	138 Hr	96726 Hr	gal	120 gal	gal/hr	0.87 gal/hr
Sftbd. Main Engine	136 Hr	97812 Hr		90 gal	gal/hr	0.66 gal/hr
Generator #1	162 Hr	56547 Hr		gal	gal/hr	gal/hr
Generator #2	147 Hr	52364 Hr	gal	gal	gal/hr	gal/hr
Generator #3	49 Hr	55829 Hr		gal	gal/hr	gal/hr
Boiler	18 Hr	39603 Hr	gal		gal/hr	

Miles this week: 2065 | Avg. Kts./Hr. : 1409 | Gal/Kt. Mi.: 16.6

Liquid Status				FUEL (By Sounding)	Main Eng Lube	Aux Eng Lube	Oily Waste	Potable Water X1000
Received								
Date	8-12	Place	KTN	gal	gal	gal	gal	gal
Date	8-14	Place	BELL	33854 gal	871 gal	gal	gal	7 gal
Date	8-17	Place	SIT	gal	gal	gal	gal	6 gal
Date	8-18	Place	JNU	gal	gal	gal	gal	5 gal
Date	8-19	Place	KTN	gal	gal	gal	gal	4 gal
Date		Place		gal	gal	gal	gal	gal
Total Received (Meter)				gal	gal	gal	gal	22 gal
On Hand 1 st Week				100443 gal	1431 gal	305 gal	4050 gal	103 gal
Total				134297 gal	2302 gal	gal	gal	125 gal
Generated							1084 gal	
Sent Ashore & via OWS				0 gal	0 gal	gal	1125 gal	
On Hand End Week				99842 gal	2094 gal	305 gal	4009 gal	102 gal
Consumed				34455 gal	208 gal	0 gal		23 gal

COMMENTS. CI- 8-12 8-13 8-14 8-15 8-16 8-17 8-18
TOTAL MG/L 3.5 3.5 3.5 3.5 0.3 2.4 3.5
FREE 1.2 3.0 2.8 1.3 0 1.2 3.5

Equipment Failure Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 08-05-07

at 0001 hours

Ending Date 08-11-07

at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	135	Hr	96588	Hr	16922	gal	80	gal	125.4	gal/hr	.59	gal/hr
Stbd. Main Engine	134	Hr	97676	Hr	16797		150	gal	125.4	gal/hr	1.11	gal/hr
Generator #1	156	Hr	56295	Hr				gal		gal/hr		gal/hr
Generator #2	145	Hr	52217	Hr		gal		gal		gal/hr		gal/hr
Generator #3	61	Hr	55780	Hr				gal		gal/hr		gal/hr
Boiler	19	Hr	39585	Hr		gal				gal/hr		

Miles this week: 2065

| Avg. Kts/Hr. : 15.3

| Gal/Kt. Mi.: 16.3

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water	
Received													
Date	8-5	Place	KTN		gal		gal		gal		gal	8	gal
Date	8-7	Place	BEL	34177	gal		gal		gal		gal	10	gal
Date		Place			gal		gal		gal		gal	9	gal
Date		Place			gal		gal		gal		gal	2	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				34177	gal		gal		gal		gal	29	gal
On Hand 1 st Week				99986	gal	1661	gal	421	gal	4141	gal	100	gal
Total				134163	gal		gal		gal		gal	129	gal
Generated										1549	gal		
Sent Ashore & via OWS				0	gal	0	gal		gal	1640	gal		
On Hand End Week				100443	gal	1431	gal	305	gal	4050	gal	103	gal
Consumed				33720	gal	230	gal	116	gal			26	gal

COMMENTS. CI- 8-05 8-06 8-07 8-08 8-09 8-10 8-11

TOTAL MG/L 0 1.8 1.0 .8 3.0 2.5 3.5

FREE 0 .1 .25 0 1.5 0.5 1.0

Equipment Failure Yes ☒ No ☐

(If "YES" include Report)

Chief Engineer Stewart Emery

Fire Screen door Power supply selenium rectifier failed, replaced with discrete diodes bridge rectifier. USCG 835 as temp repair until either approved, or replaced.

#2 Gen Voltage regulator died due to ground in exciter. Exciter repaired, regulator replaced with VR6. Lead to diodes rubbed through insulation, moved wire, and 4 heat shrink sleeves over rub spot.

Chief Engineer's Weekly Summary

Starting Date 07-29-07 at 0001 hours
Ending Date 08-04-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	126	Hr	96453	Hr	16569	gal	80	gal	131.5	gal/hr	0.67	gal/hr
Stbd. Main Engine	130	Hr	97542	Hr	17095		120	gal	131.5	gal/hr	0.76	gal/hr
Generator #1	160	Hr	56140	Hr				gal		gal/hr		gal/hr
Generator #2	166	Hr	52073	Hr		gal		gal		gal/hr		gal/hr
Generator #3	16	Hr	55719	Hr				gal		gal/hr		gal/hr
Boiler	23	Hr	39566	Hr		gal				gal/hr		

Miles this week: 2065

| Avg. Kts/Hr. : 16.1

| Gal/Kt. Mi.: 16.3

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water	
Received													
Date	7-29	Place	KTN		gal		gal		gal		gal	8	gal
Date	7-31	Place	BEL	35390	gal		gal		gal		gal	9	gal
Date	8-2	Place	KTN		gal		gal		gal		gal	10	gal
Date	8-3	Place			gal		gal		gal		gal	5	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				34301	gal		gal		gal		gal		gal
On Hand 1 st Week				99351	gal	1860	gal	426	gal	4036	gal	100	gal
Total					gal		gal		gal		gal	132	gal
Generated										105	gal		
Sent Ashore & via OWS				0	gal	0	gal		gal		gal		
On Hand End Week				99986	gal	1661	gal	421	gal	4141	gal	100	gal
Consumed				33666	gal	199	gal	5	gal			32	gal

COMMENTS. CI- 7/29 7/30 7/31 8/1 8/2 8/3 8/4

TOTAL MG/L .6 0 0 1.8 .2 0 -

FREE .1 0 0 .8 0 0 -

Equipment Failure

Yes ☐ No ☒

(If "YES" include Report)

Chief Engineer Stewart Emery

Chief Engineer's Weekly Summary

Starting Date 7-22-07 at 0001 hours
Ending Date 7-28-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	133	Hr	96327	Hr		gal	90	gal		gal/hr	.067	gal/hr
Stbd. Main Engine	132	Hr	97412	Hr			100	gal		gal/hr	0.76	gal/hr
Generator #1	158	Hr	55980	Hr				gal		gal/hr		gal/hr
Generator #2	157	Hr	51907	Hr		gal		gal		gal/hr		gal/hr
Generator #3	13	Hr	55703	Hr				gal		gal/hr		gal/hr
Boiler	21	Hr	39543	Hr		gal				gal/hr		

Miles this week: 2065

| Avg. Kts./Hr. : 15.5

| Gal/Kt. Mi.: 16.3

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X1000	
Received													
Date	7-22	Place	KTN		gal		gal		gal		gal	4	gal
Date	7-24	Place	BELL	33675	gal		gal		gal		gal	10	gal
Date	7-26	Place	KTN		gal		gal		gal		gal	6	gal
Date	7-27	Place	SIT		gal		gal		gal		gal	5	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal		gal
On Hand 1 st Week				98942	gal	2036	gal	426	gal	3016	gal	104	gal
Total				132617	gal		gal		gal		gal	129	gal
Generated										1020	gal		
Sent Ashore & via OWS				0	gal	0	gal		gal		gal		
On Hand End Week				99351	gal	1860	gal	426	gal	4036	gal	100	gal
Consumed				33266	gal	176	gal	0	gal			29	gal

COMMENTS. CI-	7/22	7/23	7/24	7/25	7/26	7/27	7/28
TOTAL MG/L	3.5	3.5	3.5	3.5	3.5	0.2	3.5
FREE	3.5	3.5	3.5	0.6	1.2	0	1.0

Equipment Failure Yes ☐ No ☒
 (If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 7-22-07

at 0001 hours

Ending Date 7-28-07

at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	133	Hr	96327	Hr		gal	90	gal		gal/hr	.067	gal/hr
Sthd. Main Engine	132	Hr	97412	Hr			100	gal		gal/hr	0.76	gal/hr
Generator #1	158	Hr	55980	Hr				gal		gal/hr		gal/hr
Generator #2	157	Hr	51907	Hr		gal		gal		gal/hr		gal/hr
Generator #3	13	Hr	55703	Hr				gal		gal/hr		gal/hr
Boiler	21	Hr	39543	Hr		gal				gal/hr		

Miles this week: 2065

| Avg. Kts/Hr. : 15.5

| Gal/Kt. Mi.: 16.3

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X1000	
Received													
Date	7-22	Place	KTN		gal		gal		gal		gal	4	gal
Date	7-24	Place	BELL	33675	gal		gal		gal		gal	10	gal
Date	7-26	Place	KTN		gal		gal		gal		gal	6	gal
Date	7-27	Place	SIT		gal		gal		gal		gal	5	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal		gal
On Hand 1st Week				98942	gal	2036	gal	426	gal	3016	gal	104	gal
Total				132617	gal		gal		gal		gal	129	gal
Generated										1020	gal		
Sent Ashore & via OWS				0	gal	0	gal		gal		gal		
On Hand End Week				99351	gal	1860	gal	426	gal	4036	gal	100	gal
Consumed				33266	gal	176	gal	0	gal			29	gal

COMMENTS. CI-	7/22	7/23	7/24	7/25	7/26	7/27	7/28
TOTAL MG/L	3.5	3.5	3.5	3.5	3.5	0.2	3.5
FREE	3.5	3.5	3.5	0.6	1.2	0	1.0

Equipment Failure

Yes

☐

No

☒

(If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 7-15-07

at 0001 hours

Ending Date 7-21-07

at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	142	Hr	96194	Hr		gal	70	gal		gal/hr	0.49	gal/hr
Sthd. Main Engine	142	Hr	97270	Hr			150	gal		gal/hr	1.05	gal/hr
Generator #1	161	Hr	55822	Hr				gal		gal/hr		gal/hr
Generator #2	91	Hr	51750	Hr		gal		gal		gal/hr		gal/hr
Generator #3	106	Hr	55690	Hr				gal		gal/hr		gal/hr
Boiler	19	Hr	39522	Hr		gal				gal/hr		

Miles this week: 2065

| Avg. Kts./Hr. : 14.54

| Gal/Kt. Mi.: 16.7

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X1000	
Received													
Date	7-15	Place	KTN		gal		gal		gal		gal	5	gal
Date	7-17	Place	BELL	34500	gal		gal		gal		gal	4	gal
Date	7-20	Place	SIT		gal		gal		gal		gal	8	gal
Date	7-21	Place	A-BAY		gal		gal		gal		gal	7	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal	0	gal		gal		gal
On Hand 1st Week				99,449	gal	2,212	gal	533	gal	5178	gal	102	gal
Total				133949	gal		gal		gal		gal	126	gal
Generated										796	gal		
Sent Ashore & via OWS				0	gal	0	gal		gal	2960	gal		
On Hand End Week				98942	gal	2036	gal	426	gal	3016	gal	104	gal
Consumed				35007	gal	76	gal	107	gal			22	gal

COMMENTS. CI-	7/15	7/16	7/17	7/18	7/19	7/20	7/21
TOTAL MG/L	0.05	3.5	0.2	3.5	3.5	3.5	3.5
FREE	0	0.08	0	1.8	1.4	1.0	0.8

Equipment Failure

Yes ☐ No ☒
 (If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 7-08-07

at 0001 hours

Ending Date 7-14-07

at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	133	Hr	96,052	Hr		gal	30	gal		gal/hr	.225	gal/hr
Stbd. Main Engine	130	Hr	97,128	Hr			150	gal		gal/hr	1.15	gal/hr
Generator #1	110	Hr	55,661	Hr				gal		gal/hr		gal/hr
Generator #2	85	Hr	51,659	Hr		gal		gal		gal/hr		gal/hr
Generator #3	165	Hr	55,525	Hr				gal		gal/hr		gal/hr
Boiler	21	Hr	39,503	Hr		gal				gal/hr		

Miles this week: 2080.5

| Avg. Kts./Hr. : 15.64

| Gal/Kt. Mi.: 15.94

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water	
Received													
Date	7/08/07	Place	KTN		gal		gal		gal		gal	9,000	gal
Date	7/10/07	Place	BELHM	34,020	gal	821	gal		gal		gal	7,000	gal
Date	7/12/07	Place	KTN		gal		gal		gal		gal	6,000	gal
Date	7/13/07	Place	SITKA		gal		gal		gal		gal	3,000	gal
Date	7/14/07	Place	A-BAY		gal		gal		gal		gal	5,000	gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				34,020	gal	821	gal	0	gal		gal	30,000	gal
On Hand 1st Week				98,587	gal	1,493	gal	533	gal	3,935	gal	97,000	gal
Total				132,607	gal	2,314	gal		gal	3,935	gal	127,000	gal
Generated										1,373	gal		
Sent Ashore & via OWS				0	gal	0	gal	0	gal	275	gal		
On Hand End Week				99,449	gal	2,212	gal	533	gal	5,033	gal	102,000	gal
Consumed				33,158	gal	102	gal	0	gal			25,000	gal

COMMENTS. CI-	7/8	7/9	7/10	7/11	7/12	7/13	7/14
TOTAL MG/L	.1	.0	.7	.6	2.0	1.5	.8
FREE	.0	.0	.4	.3	.9	.6	.0

Jr. Engineer has been repairing worn out screw holes in MSD book cells. Mechanics at Dewey Griffin Motors in Bellingham recommend an engine replacement for the ADA van after they found that 2 cylinders had no compression. The van is 12 years old with 110,500 miles on the odometer.

Equipment Failure Yes ☐ No ☒

(If "YES" include Report)

Chief Engineer Frank Czuba

Chief Engineer's Weekly Summary

Starting Date 7-01-07

at 0001 hours

Ending Date 7-07-07

at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	135	Hr	95,919	Hr		gal		gal		gal/hr		gal/hr
Stbd. Main Engine	135	Hr	96,998	Hr			30	gal		gal/hr	.22	gal/hr
Generator #1	143	Hr	55,551	Hr				gal		gal/hr		gal/hr
Generator #2	159	Hr	51,574	Hr		gal		gal		gal/hr		gal/hr
Generator #3	33	Hr	55,360	Hr				gal		gal/hr		gal/hr
Boiler	20	Hr	39,482	Hr		gal				gal/hr		

Miles this week: 2,065

| Avg. Kts./Hr. : 15.3

| Gal/Kt. Mi.: 16.9

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water		
Received														
Date	7/1/07	Place	KTN		gal		gal		gal		gal	5,000	gal	
Date	7/3/07	Place	BELLINGHAM	34,002	gal		gal	220	gal		gal	8,000	gal	
Date	7/6/07	Place	SITKA		gal		gal		gal		gal	9,000	gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Total Received (Meter)				34,002	gal	0	gal	220	gal	0	gal	22,000	gal	
On Hand 1 st Week				99,533	gal	1,493	gal	309	gal	3,727	gal	99,000	gal	
Total				133,535	gal	1,493	gal	529	gal	3,727	gal	121,000	gal	
Generated											208	gal		
Sent Ashore & via OWS				0	gal	0	gal	0	gal	0	gal			
On Hand End Week				98,587	gal	1,493	gal	533	gal	3,935	gal	97,000	gal	
Consumed				34,948	gal	30	gal	0	gal			24,000	gal	

COMMENTS. CI- 7/1 7/2 7/3 7/4 7/5 7/6 7/7

TOTAL MG/L .2 .1 .2 .1 .1 .1 .1

FREE MG/L .2 .1 .1 .1 .1 .1 .0

Changed out the governor on #3 generator. This should improve load sharing between the generators.

Equipment Failure Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Frank Czuba

Chief Engineer's Weekly Summary

Starting Date 6-24-07 at 0001 hours
Ending Date 6-30-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	139	Hr	95784	Hr		gal		gal		gal/hr		gal/hr
Sthd. Main Engine	139	Hr	96863	Hr				gal		gal/hr		gal/hr
Generator #1	158	Hr	55408	Hr				gal		gal/hr		gal/hr
Generator #2	87	Hr	51415	Hr		gal		gal		gal/hr		gal/hr
Generator #3	46	Hr	55327	Hr				gal		gal/hr		gal/hr
Boiler	21	Hr	39462	Hr		gal				gal/hr		

Miles this week: 2065 | Avg. Kts/Hr. : 14.8 | Gal/Kt. Mi.: 16.8

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X1000	
Received													
Date	6-24	Place	KTN		gal		gal		gal		gal	13	gal
Date	6-26	Place	BELL	34020	gal		gal		gal		gal	13	gal
Date	6-28	Place	KTN		gal		gal		gal		gal	5	gal
Date	6-29	Place	SIT		gal		gal		gal		gal	3	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal		gal
On Hand 1 st Week				100208	gal	1859	gal	514	gal	2629	gal	91	gal
Total				134228	gal		gal		gal		gal	125000	gal
Generated										1100	gal		
Sent Ashore & via OWS				0	gal	0	gal	0	gal	0	gal		
On Hand End Week				99533	gal	1493	gal	309	gal	3727	gal	99	gal
Consumed				34695	gal	366	gal	205	gal			26	gal

COMMENTS. CI- 6/24 6/25 6/26 6/27 6/28 6/29 6/30
TOTAL MG/L 1.3 3.5 3.5 3.5 3.5 3.5 3.5
FREE 0.4 3.5 3.5 3.5 0.7 1.5 0.4

Securing MSD's in port

Equipment Failure Yes ☐ No ☒
(If "YES" include Report)

Changed Gov. on #3 SSDG

Chief Engineer Ray Justice

Changed Gov. on #3 SSDG This Gov. functioned but would not share properly with the other gen's.

Chief Engineer's Weekly Summary

Starting Date 6/17/07 at 0001 hours
Ending Date 6/23/07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	136	Hr	95645	Hr		gal	90	gal		gal/hr	0.66	gal/hr
Stbd. Main Engine	136	Hr	96724	Hr			130	gal		gal/hr	0.95	gal/hr
Generator #1	158	Hr	55250	Hr				gal		gal/hr		gal/hr
Generator #2	47	Hr	51328	Hr		gal		gal		gal/hr		gal/hr
Generator #3	147	Hr	55281	Hr				gal		gal/hr		gal/hr
Boiler	20	Hr	39441	Hr		gal				gal/hr		

Miles this week: 2065 | Avg. Kts./Hr. : 15.2 | Gal/Kt. Mi.: 16.1

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X1000	
Received													
Date	6/17	Place	KTN		gal		gal		gal		gal	3	gal
Date	6/19	Place	BEL	33775	gal		gal		gal		gal	6	gal
Date	6/22	Place	SIT		gal		gal		gal		gal	6	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal	15	gal
On Hand 1 st Week				99680	gal		gal		gal	4651	gal	103	gal
Total				133455	gal		gal		gal		gal	118	gal
Generated										767	gal		
Sent Ashore & via OWS				0	gal	0	gal	0	gal	2789	gal		
On Hand End Week				100208	gal	1859	gal	514	gal	2629	gal	91	gal
Consumed				33247	gal	206	gal	14	gal			27	gal

COMMENTS. CI- 6/17 6/18 6/19 6/20 6/21 6/22 6/23
TOTAL MG/L 3.5 3.5 0.4 3.5 3.5 0.9 0
FREE 3.2 3.5 0 1.7 0.9 0.2 0

We have resumed securing the MSD units in port as much as possible.

Equipment Failure Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 6-10-07

at 0001 hours

Ending Date 6-16-07

at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	138	Hr	95,509	Hr		gal	90	gal		gal/hr	.65	gal/hr
Stbd. Main Engine	138	Hr	96,588	Hr			90	gal		gal/hr	.65	gal/hr
Generator #1	168	Hr	54,992	Hr				gal		gal/hr		gal/hr
Generator #2	27	Hr	51,291	Hr		gal		gal		gal/hr		gal/hr
Generator #3	167	Hr	55,114	Hr				gal		gal/hr		gal/hr
Boiler	20	Hr	39,421	Hr		gal				gal/hr		

Miles this week: 2065

| Avg. Kts./Hr. : 14.96

| Gal/Kt. Mi.: 16.085

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water	
Received													
Date	6/10	Place	KTN		gal		gal		gal		gal	7,000	gal
Date	6/12	Place	BELHM	33,880	gal		gal		gal		gal	7,000	gal
Date	6/14	Place	KTN		gal		gal		gal		gal	6,000	gal
Date	6/15	Place	A-BAY		gal		gal		gal		gal	4,000	gal
Date	6/16	Place	A-BAY		gal		gal		gal		gal	3,000	gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				33,880	gal		gal		gal		gal	27,000	gal
On Hand 1 st Week				99,016	gal	2,212	gal	533	gal	3,745	gal	141,000	gal
Total				132,896	gal	2,212	gal	533	gal	3,745	gal	168,000	gal
Generated										906	gal		
Sent Ashore				0	gal	0	gal	0	gal	0	gal		
On Hand End Week				99,680	gal	2,065	gal	528	gal	4,651	gal	138,000	gal
Consumed				33,216	gal	147	gal	5	gal			30,000	gal

COMMENTS. CI-MSD EFFLUENT

	6/10	6/11	6/12	6/13	6/14	6/15	6/16
TOTAL MG/L	3.5+	3.5+	3.5+	3.5+	3.5	3.5+	.3
FREE MG/L	2.2	1.4	1.2	1.5	1.0	2.8	0

Replaced rubber seat in 150 lb aux. start air supply regulator. Garbage disposal near dishwasher would not start was difficult to turn impeller. New one on order. Re-torqueing of main engine heads has begun. Installed cooling fans in computer server cabinet Todd shipyard personnel aboard in Bellingham 6/12/07 to finish items on punchlist

Equipment Failure

Yes ☒ No ☐
(If "YES" include Report)

Chief Engineer's Weekly Summary

Starting Date 6-3-07

at 0001 hours

Ending Date 6-9-07

at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	134	Hr	95,371	Hr		gal	90	gal		gal/hr		gal/hr
Sthd. Main Engine	134	Hr	96,450	Hr			120	gal		gal/hr		gal/hr
Generator #1	137	Hr	54,824	Hr				gal		gal/hr		gal/hr
Generator #2	31	Hr	51,264	Hr		gal		gal		gal/hr		gal/hr
Generator #3	165	Hr	54,947	Hr				gal		gal/hr		gal/hr
Boiler	34	Hr	39,401	Hr		gal				gal/hr		

Miles this week: 2,065

| Avg. Kts./Hr. : 15.41

| Gal/Kt.mI Mi.:16.01

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water	
Received													
Date	6/3	Place	KTN		gal		gal		gal		gal	6,000	gal
Date	6/5	Place	BELLHM	33,316	gal	1,700	gal	249	gal		gal	7,000	gal
Date	6/8	Place	ABAY		gal		gal		gal		gal	13,000	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				33,316	gal	1,700	gal	249	gal		gal	26,000	gal
On Hand 1 st Week				98,762	gal	647	gal	284	gal	3,319	gal	133,000	gal
Total				132,078	gal	2,347	gal	533	gal	3,319	gal	159,000	gal
Generated											gal		
Sent Ashore				0	gal	0	gal	0	gal		gal		
On Hand End Week				99,016	gal	2,212	gal	533	gal	3,745	gal	141,000	gal
Consumed				33,062	gal	135	gal	0	gal			18,000	gal

COMMENTS. CI- 6/3 6/4 6/5 6/6 6/7 6/8 6/9 MSD EFFLUENT

TOTAL MG/L 3.5+ 3.5+ 3.5+ 3.5+ 3.5 3.5 3.5

FREE MG/L 2.8 1.4 1.2 1.5 1.4 2.4 2.0

BELLINGHAM SHIPYARD WORKERS ONBOARD AT BELLINGHAM TO WORK ON PORT CARDOOR. MEASUREMENTS HAVE BEEN TAKEN AND SHIMS WILL BE DELIVERED NEXT WEEK

Equipment Failure Yes ☐ No ☒ X
(If "YES" include Report)

Chief Engineer FRANK CZUBA

Chief Engineer's Weekly Summary

Starting Date 5-27-07 at 0001 hours

Ending Date 6-02-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	135	Hr	95237	Hr		gal	95	gal		gal/hr		gal/hr
Stbd. Main Engine	135	Hr	96316	Hr		gal	130	gal		gal/hr		gal/hr
Generator #1	71	Hr	54687	Hr		gal		gal		gal/hr		gal/hr
Generator #2	135	Hr	51233	Hr		gal		gal		gal/hr		gal/hr
Generator #3	143	Hr	54782	Hr		gal		gal		gal/hr		gal/hr
Boiler	22	Hr	39367	Hr		gal				gal/hr		

Miles this week: **2065** | Avg. Kts./Hr. : **15.30** Gal/Kt.Mi.: **17.75** |

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water		
Received														
Date	5/27	Place	Ktn		gal		gal		gal		gal	6K	gal	
Date	5/29	Place	Bel	36,205	gal		gal		gal		gal	7K	gal	
Date	5/31	Place	Ktn		gal		gal		gal		gal	8K	gal	
Date	6/1	Place	ABY		gal		gal		gal		gal	2K	gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Total Received (Meter)				36,205	gal		gal		gal		gal	23K	gal	
On Hand 1 st Week				98,224	gal	873	gal	309	gal	757	gal	34K	gal	
Total				134,429	gal	873	gal	309	gal	757	gal	57K	gal	
Generated											93	gal		
Sent Ashore					gal	0	gal	0	gal	0	gal			
On Hand End Week				98,762	gal	647	gal	284	gal	850	gal	33K	gal	
Consumed				35,667	gal	226	gal	25	gal			24K	gal	

COMMENTS. Cl, 5-27 5-28 5-29 5-30 5-31 6-01 6-02
3.5 2.9 1.5 .6 2.3 2.0 1.7

Bellingham Bay personnel came aboard to assess work on the Port Cardoor which was damaged. They will return with a new swing beam upon our next arrival in Bellingham.

Equipment Failure Yes ☐ No ☒ (If "YES" include Report)

Chief Engineer Steven Cunningham

Chief Engineer's Weekly Summary

Starting Date 5-20-07 at 0001 hours

Ending Date 5-26-07 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	130	Hr	95102	Hr		gal	100	gal		gal/hr		gal/hr
Stbd. Main Engine	130	Hr	96181	Hr		gal	110	gal		gal/hr		gal/hr
Generator #1	48	Hr	54614	Hr		gal		gal		gal/hr		gal/hr
Generator #2	168	Hr	51098	Hr		gal		gal		gal/hr		gal/hr
Generator #3	141	Hr	54639	Hr		gal		gal		gal/hr		gal/hr
Boiler	25	Hr	39345	Hr		gal				gal/hr		

Miles this week: **2065** | Avg. Kts/Hr. : **15.88** Gal/Kt.Mi.: **16.73**

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water		
Received														
Date	5/22	Place	Bellingham	33,953	gal		gal		gal		gal	4K	gal	
Date	5/25	Place	ABY		gal		gal		gal		gal	8K	gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Total Received (Meter)				33,953	gal		gal		gal		gal	12K	gal	
On Hand 1 st Week				98,825	gal	1082	gal	416	gal	290	gal	37K	gal	
Total				132,778	gal	1082	gal	416	gal	290	gal	49K	gal	
Generated											467	gal		
Sent Ashore					gal	0	gal	0	gal	0	gal			
On Hand End Week				98,224	gal	873	gal	309	gal	757	gal	34K	gal	
Consumed				34,554	gal	209	gal	107	gal			12K	gal	

COMMENTS. Cl, 5-20 5-21 5-22 5-23 5-24 5-25 5-26
1.7 .4 .3 0 .4 .5 .1

ASD aboard to work on the Port Cardoor which was damaged. Job incomplete.

Equipment Failure Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Steven Cunningham

Chief Engineer's Weekly Summary

Starting Date 8/27/06 at 0000 hours
Ending Date 9/2/06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	138	Hr	93576	Hr		gal	175	gal		gal/hr		gal/hr
Std. Main Engine	133	Hr	94648	Hr		gal	120	gal		gal/hr		gal/hr
Generator #1	166	Hr	53330	Hr		gal		gal		gal/hr		gal/hr
Generator #2	159	Hr	49469	Hr		gal	12	gal		gal/hr		gal/hr
Generator #3	8	Hr	53508	Hr		gal		gal		gal/hr		gal/hr
Boiler	6	Hr	39003	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week: **2020** | Avg. Kts./Hr. : **14.6** | Gal/Kt. Mi.: **17.2**

Liquid Status				FUEL (By Sounding)		Main Eng Lube (By Sounding)		Aux Eng Lube (By Sounding)		Oily Waste (By Sounding)		Potable Water X 1000	
Received													
Date	8/29	Place	Bel	34380	gal		gal		gal		gal	15	gal
Date	9/1	Place	Sit		gal		gal		gal		gal	9	gal
Date	9/2	Place	Aby		gal		gal		gal		gal	2	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal		gal
On Hand 1 st Week				99323	gal	1521	gal	587	gal	3358	gal	103	gal
Total				133703	gal		gal		gal		gal	129	gal
Generated											1119	gal	
Sent Ashore x OWS				0	gal	0	gal	0	gal		gal		
On Hand End Week				98942	gal	1226	gal	575	gal	4477	gal	102	gal
Consumed				34761	gal	295	gal	12	gal			27	gal

COMMENTS. CI- 8/27 8/28 8/29 8/30 8/31 9/1 9/2
TOTAL MG/I 1.1 1.5 1.2 1.6 2.1 2.5 1.5
FREE MG/I .2 .1 .1 .2 .1 .3 .1

8/27 #2 Gen 2000hr service
Pumping MSD down to app 10% before each port.

Equipment Failure Yes ☐ No ☒ **X**
(If "YES" include Report)

Chief Engineer Roger Hanson

Chief Engineer's Weekly Summary

Starting Date 8-20-06 at 0000 hours
Ending Date 8-26-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	140	Hr	93438	Hr		gal	155	gal		gal/hr	1.1	gal/hr
Stbd. Main Engine	140	Hr	94515	Hr		gal	140	gal		gal/hr	1.0	gal/hr
Generator #1	158	Hr	53164	Hr		gal		gal		gal/hr		gal/hr
Generator #2	161	Hr	49310	Hr		gal		gal		gal/hr		gal/hr
Generator #3	7	Hr	53500	Hr		gal		gal		gal/hr		gal/hr
Boiler	14	Hr	38989	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week 2020

Avg. Kts./Hr. 14.4

Gal/Kt. Mi.: 16.6

Liquid Status				FUEL (By Sounding)		Main Eng Lube (By Sounding)		Aux Eng Lube (By Sounding)		Oily Waste (By Sounding)		Potable Water - X 1000	
Received													
Date	8-23	Place		34350	gal		gal		gal		gal	11	gal
Date	8-26	Place			gal		gal		gal		gal	5	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal		gal
On Hand 1 st Week				98665	gal	1803	gal	1803	gal	2402	gal		gal
Total				133015	gal		gal		gal		gal		gal
Generated											956	gal	
Sent Ashore x OWS					gal		gal		gal	0	gal		
On Hand End Week				99323	gal	1521	gal	587	gal	3358	gal	103	gal
Consumed				33692	gal	282	gal	0	gal			16	gal

COMMENTS. CI- 8-20 8-21 8-22 8-23 8-24 8-25 8-26
TOTAL MG/I 3.5 2.8 3.5 2.0 3.5 3.5 1.3
FREE MG/I 0.9 0.3 0.5 0.5 0.8 0.7 0.4

Equipment Failure

Yes ☐ No ☒
 (If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 8-13-06 at 0000 hours
Ending Date 8-19-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	138	Hr	93298	Hr		gal	150	gal		gal/hr	1.09	gal/hr
Stbd. Main Engine	135	Hr	94375	Hr		gal	90	gal		gal/hr	0.66	gal/hr
Generator #1	69	Hr	53006	Hr		gal		gal		gal/hr		gal/hr
Generator #2	168	Hr	49149	Hr		gal		gal		gal/hr		gal/hr
Generator #3	90	Hr	53493	Hr		gal		gal		gal/hr		gal/hr
Boiler	13	Hr	38975	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week 2020

Avg. Kts./Hr. 14.6

Gal/Kt. Mi.: 17.2

Liquid Status				FUEL (By Sounding)		Main Eng Lube (By Sounding)		Aux Eng Lube (By Sounding)		Oily Waste (By Sounding)		Potable Water X 1000	
Received													
Date	8-15	Place	BELL	32601	gal		gal		gal		gal	13	gal
Date	8-17	Place	KTN		gal		gal		gal		gal	15	gal
Date	8-18	Place	SIT		gal		gal		gal		gal	3	gal
Date	8-19	Place	A-BAY		gal		gal		gal		gal	2	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal	33	gal
On Hand 1 st Week				100916	gal	2065	gal	587	gal	3409	gal	103	gal
Total				133517	gal		gal		gal		gal	136	gal
Generated										998	gal		
Sent Ashore x OWS					gal		gal		gal	2015	gal		
On Hand End Week				98665	gal	1803	gal	587	gal	2402	gal	103	gal
Consumed				34852	gal	262	gal	0	gal			33	gal

COMMENTS. CI-	8-13	8-14	8-15	8-16	8-17	8-18	8-19
TOTAL MG/I	0.3	1.9	1.4	0.3	0.4	3.5	1.6
FREE MG/I	0.2	0.4	0	0	0	2.9	0.4

Equipment Failure

Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 8-6-06 at 0000 hours
Ending Date 8-12-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	136	Hr	93,160	Hr		gal	150	gal		gal/hr	1.1	gal/hr
Stbd. Main Engine	136	Hr	94,240	Hr		gal	130	gal		gal/hr	.96	gal/hr
Generator #1	160	Hr	52,947	Hr		gal		gal		gal/hr		gal/hr
Generator #2	168	Hr	48,981	Hr		gal		gal		gal/hr		gal/hr
Generator #3	0	Hr	53,403	Hr		gal		gal		gal/hr		gal/hr
Boiler	16	Hr	38,962	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week 2,020

Avg. Kts/Hr. 14.85

Gal/Kt. Mi.: 15.55

Liquid Status				FUEL (By Sounding)		Main Eng Lube (By Sounding)		Aux Eng Lube (By Sounding)		Oily Waste (By Sounding)		Potable Water X 1000	
Received													
Date	8/6	Place	KTN		gal		gal		gal		gal	4,000	gal
Date	8/8	Place	BELHM	33,451	gal	1,698	gal	360	gal		gal	7,000	gal
Date	8/11	Place	SIT		gal		gal		gal		gal	14,000	gal
Date	8/12	Place	A-BAY		gal		gal		gal		gal	5,000	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal	30,000	gal
On Hand 1 st Week				98,875	gal	667	gal	232	gal	4,126	gal	99,500	gal
Total				132,326	gal	2,365	gal	592	gal	4,126	gal	129,500	gal
Generated										1,033	gal		
Sent Ashore x OWS				0	gal	0	gal	0	gal	1,750	gal		
On Hand End Week				100,916	gal	2,065	gal	587	gal	3,409	gal	103,000	gal
Consumed				31,410	gal	300	gal	5	gal			26,500	gal

COMMENTS. CI- 8/6 8/7 8/8 8/9 8/10 8/11 8/12
TOTAL MG/I .4 1.3 3.5 0 .1 1.5 .9
FREE MG/I 0 .1 2.8 0 0 2.5 0

The USCG allowed a temporary epoxy patch after inspecting the holes in a water tight door caused by the sharp end of a fireaxe. Our plan is to remove the door in Bellingham and make repairs in the machine shop. Tom Carey & USCG aboard in Ktn 8/10 to witness weight test of portside FRB davit with new rope installed. All went well.

Equipment Failure Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Frank Czuba

Chief Engineer's Weekly Summary

Starting Date 7-30-06 at 0000 hours
Ending Date 8-5-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	136	Hr	93,024	Hr		gal	170	gal		gal/hr	1.25	gal/hr
Stbd. Main Engine	136	Hr	94,104	Hr		gal	30	gal		gal/hr	.22	gal/hr
Generator #1	160	Hr	52,787	Hr		gal		gal		gal/hr		gal/hr
Generator #2	160	Hr	48,813	Hr		gal		gal		gal/hr		gal/hr
Generator #3	8	Hr	53,403	Hr		gal		gal		gal/hr		gal/hr
Boiler	12	Hr	38,946	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week 2,020

Avg. Kts./Hr. 14.85

Gal/Kt. Mi.: 16.78

Liquid Status				FUEL (By Sounding)		Main Eng Lube (By Sounding)		Aux Eng Lube (By Sounding)		Oily Waste (By Sounding)		Potable Water X 1000	
Received													
Date	7/30	Place	KTN		gal		gal		gal		gal	4,000	gal
Date	8/1	Place	BELHM	33,540	gal		gal		gal		gal	5,000	gal
Date	8/3	Place	KTN		gal		gal		gal		gal	3,000	gal
Date	8/4	Place	SIT		gal		gal		gal		gal	7,000	gal
Date	8/5	Place	A-BAY		gal		gal		gal		gal	4,000	gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				33,540	gal		gal		gal		gal	23,000	gal
On Hand 1 st Week				99,523	gal	845	gal	232	gal	3,766	gal	134,000	gal
Total				132,763	gal	845	gal	232	gal	3,766	gal	157,000	gal
Generated										360	gal		
Sent Ashore x OWS				0	gal	0	gal	0	gal	0	gal		
On Hand End Week				98,875	gal	667	gal	232	gal	4,126	gal	99,500	gal
Consumed				33,888	gal	178	gal	0	gal			57,500	gal

COMMENTS. CI-	7-30	7-31	8-1	8-2	8-3	8-4	8-5
TOTAL MG/I	3.5	1.6	1.5	2.2	1.5	.2	.3
FREE MG/I	1.6	0.0	.1	1.1	.2	.0	.0

Equipment Failure

Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer FRANK CZUBA

Chief Engineer's Weekly Summary

Starting Date 7-23-06 at 0000 hours
Ending Date 7-29-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	134	Hr	92888	Hr		gal	100	gal		gal/hr	0.75	gal/hr
Stbd. Main Engine	138	Hr	93968	Hr		gal	130	gal		gal/hr	0.97	gal/hr
Generator #1	93	Hr	52627	Hr		gal		gal		gal/hr		gal/hr
Generator #2	168	Hr	48653	Hr		gal		gal		gal/hr		gal/hr
Generator #3	65	Hr	53395	Hr		gal	120	gal		gal/hr		gal/hr
Boiler	12	Hr	38934	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week 2020

Avg. Kts/Hr. 14.6

Gal/Kt. Mi.: 16.6

Liquid Status				FUEL (By Sounding)		Main Eng Lube (By Sounding)		Aux Eng Lube (By Sounding)		Oily Waste (By Sounding)		Potable Water X 1000	
Received													
Date	7-23	Place	KTN		gal		gal		gal		gal		gal
Date	7-25	Place	BELL	33100	gal		gal		gal		gal		gal
Date	7-28	Place	SIT		gal		gal		gal		gal		gal
Date	7-29	Place	A-BAY		gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal		gal
On Hand 1 st Week				99911	gal	1055	gal	353	gal	3300	gal	102	gal
Total				133011	gal		gal		gal		gal	154	gal
Generated										466	gal		
Sent Ashore x OWS					gal		gal		gal	0	gal		
On Hand End Week				99523	gal	845	gal	232	gal	3766	gal	134	gal
Consumed				33488	gal	210	gal	121	gal			20	gal

COMMENTS. CI- 7-23 7-24 7-25 7-26 7-27 7-28 7-29
TOTAL MG/I 3.1 0.9 1.2 3.5 3.5 3.5 1.6
FREE MG/I 0.5 0.2 0.2 2.4 3.0 1.5 1.3

Equipment Failure

Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 7-16-06 at 0000 hours
Ending Date 7-22-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	134	Hr	92754	Hr		gal	150	gal		gal/hr	1.12	gal/hr
Stbd. Main Engine	138	Hr	93830	Hr		gal	100	gal		gal/hr	0.72	gal/hr
Generator #1	104	Hr	52534	Hr		gal	100	gal		gal/hr		gal/hr
Generator #2	168	Hr	48485	Hr		gal		gal		gal/hr		gal/hr
Generator #3	59	Hr	53330	Hr		gal		gal		gal/hr		gal/hr
Boiler	19	Hr	38922	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week 2020 | Avg. Kt.s/Hr. 14.6 | Gal/Kt. Mi.: 17.4

Liquid Status				FUEL (By Sounding)		Main Eng Lube (By Sounding)		Aux Eng Lube (By Sounding)		Oily Waste (By Sounding)		Potable Water X 1000	
Received													
Date	7-16	Place	KTN		gal		gal		gal		gal	6	gal
Date	7-18	Place	BELL	33230	gal		gal		gal		gal	13	gal
Date	7-21	Place	SIT		gal		gal		gal		gal	16	gal
Date	7-22	Place	A-BAY		gal		gal		gal		gal	7	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal	42	gal
On Hand 1 st Week				101823	gal	1271	gal	460	gal	4900	gal	105	gal
Total				135053	gal		gal		gal		gal	147	gal
Generated										675	gal		
Sent Ashore x OWS					gal		gal		gal	2275	gal		
On Hand End Week				99911	gal	1055	gal	353	gal	3300	gal	102	gal
Consumed				35142	gal	216	gal	107	gal			45	gal

COMMENTS. CI- 7-16 7-17 7-18 7-19 7-20 7-21 7-22
TOTAL MG/I 2.3 1.8 3.5 3.5 3.5 2.9 3.5
FREE MG/I 0.4 0.6 0.9 3.5 1.0 0.7 3.5

Equipment Failure Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 7/9/06 at 0000 hours
Ending Date 7/15/06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours		Consumption		Rate	
	End week	Grand Total	Fuel Oil	Lube Oil	Fuel Oil	Lube Oil
Port Main Engine	132 Hr	92620 Hr	gal	120 gal	gal/hr	gal/hr
Stbd. Main Engine	135 Hr	93692 Hr	gal	110 gal	gal/hr	gal/hr
Generator #1	139 Hr	52430 Hr	gal	4 gal	gal/hr	gal/hr
Generator #2	168 Hr	48317 Hr	gal	gal	gal/hr	gal/hr
Generator #3	25 Hr	53271 Hr	gal	gal	gal/hr	gal/hr
Boiler	14 Hr	38704 Hr	gal	gal	gal/hr	gal/hr
Amos Hours updated? Yes 38964						

Miles this week: 2020 | Avg. Kts/Hr. : 14.9 | Gal/Kt. Mi.: 16.2

Liquid Status				FUEL (By Sounding)	Main Eng Lube (By Sounding)	Aux Eng Lube (By Sounding)	Oily Waste (By Sounding)	Potable Water X 1000
Received								
Date	7/11	Place	Bel	gal	gal	gal	gal	23 gal
Date	7/14	Place	Sit	gal	gal	gal	gal	15 gal
Date	7/15	Place	Aby	gal	gal	gal	gal	5 gal
Date		Place		gal	gal	gal	gal	gal
Date		Place		gal	gal	gal	gal	gal
Date		Place		gal	gal	gal	gal	gal
Total Received (Meter)				33491 gal	gal	gal	gal	43 gal
On Hand 1 st Week				101205 gal	1463 gal	468 gal	3843 gal	104 gal
Total				134696 gal	1463 gal	468 gal	3843 gal	147 gal
Generated							1407 gal	
Sent Ashore x OWS				0 gal	0 gal	0 gal	350 gal	
On Hand End Week				101823 gal	1271 gal	460 gal	4900 gal	99 gal
Consumed				32873 gal	230 gal	4 gal		48 gal

COMMENTS. CI-	7/9	7/10	7/11	7/12	7/13	7/14	7/15
TOTAL MG/I	3.5	3.5	3.2	3.3	3.5	3.2	0.8
FREE MG/I	0.4	3	2	2.5	2.2	2	0.2

Equipment Failure Yes ☐ No ☒ (If "YES" include Report)

Chief Engineer Roger Hanson

Chief Engineer's Weekly Summary

Starting Date 7/2/06 at 0000 hours
Ending Date 7/8/06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours		Consumption		Rate	
	End week	Grand Total	Fuel Oil	Lube Oil	Fuel Oil	Lube Oil
Port Main Engine	141 Hr	92488 Hr		180 gal		gal/hr
Stbd. Main Engine	141 Hr	93557 Hr		90 gal		gal/hr
Generator #1	102 Hr	52291 Hr				gal/hr
Generator #2	106 Hr	48149 Hr				gal/hr
Generator #3	62 Hr	53246 Hr		100 gal		gal/hr
Boiler	19 Hr	38690 Hr				gal/hr

Miles this week: **2020** | Avg. Kts./Hr. : **14.3** | Gal/Kt. Mi.: **15.3**

Liquid Status				FUEL (By Sounding)	Main Eng Lube (By Sounding)	Aux Eng Lube (By Sounding)	Oily Waste (By Sounding)	Potable Water X 1000
Received								
Date	7/2	Place	Ktn		gal	gal	gal	13 gal
Date	7/4	Place	Bel	33610	gal	gal	gal	17 gal
Date	7/6	Place	Ktn		gal	gal	gal	4 gal
Date	7/7	Place	Sit		gal	gal	gal	13 gal
Date	7/8	Place	Aby		gal	gal	gal	6 gal
Date		Place			gal	gal	gal	gal
Total Received (Meter)				33610	gal	gal	gal	53 gal
On Hand 1 st Week				98663	gal	1575 gal	535 gal	2628 gal
Total				132273	gal	1575 gal	535 gal	2628 gal
Generated							1215 gal	
Sent Ashore				0	gal	0 gal	0 gal	
On Hand End Week				101205	gal	1463 gal	468 gal	3843 gal
Consumed				31068	gal	270 gal	100 gal	49 gal

COMMENTS. CI- Total, Free 2 3 4 5 6 7 8
3.5 2.5 2.5 3.5 3.0 3.5 3.5
0.4 0.3 0.3 0.8 0.7 0.8 1.1

7/4 - Pt FRB winch wire was damaged during retrieval of FRB. 2392 filed, 835 issued, wire ordered.

Equipment Failure Yes ☒ No ☐
(If "YES" include Report)

Chief Engineer Roger Hanson

Chief Engineer's Weekly Summary

Starting Date 6/25/2006 at 0000 hours
Ending Date 7/1/2006 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours		Consumption		Rate	
	End week	Grand Total	Fuel Oil	Lube Oil	Fuel Oil	Lube Oil
Port Main Engine	138 Hr	92347 Hr	gal	120 gal	gal/hr	1.15 gal/hr
Stbd. Main Engine	138 Hr	93416 Hr	gal	60 gal	gal/hr	2.3 gal/hr
Generator #1	165 Hr	52189 Hr	gal	gal	gal/hr	gal/hr
Generator #2	1 Hr	48043 Hr	gal	gal	gal/hr	gal/hr
Generator #3	167 Hr	53184 Hr	gal	gal	gal/hr	gal/hr
Boiler	14 Hr	Hr	gal		gal/hr	
Amos Hours updated? Yes						

Miles this week: 2020 | Avg. Kts/Hr. : 14.6 | Gal/Kt. Mi.: 14.51

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X 1000	
Received													
Date	6/27	Place	Bel	32710	gal		gal		gal	904 off	gal	15	gal
Date	6/30	Place	Aby		gal		gal		gal		gal	11	gal
Date	7/1	Place	Aby		gal		gal		gal		gal	11	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				32710	gal		gal		gal		gal	37	gal
On Hand 1 st Week				95208	gal	1661	gal	577	gal	5008	gal	101	gal
Total				127990	gal	1661	gal	577	gal	4104	gal	138	gal
Generated											-1097	gal	
Sent Ashore by OWS				0	gal	0	gal	0	gal	1050	gal		
On Hand End Week				98663	gal	1575	gal	535	gal	2628	gal	100	gal
Consumed				29327	gal	86	gal	37	gal			38	gal

COMMENTS. Cl- 25 - 26 - 27 - 28 - 29 - 30 - 01
TOTAL MG/l 3.5 3.5 3.5 0.4 1.3 2.3 0.9
FREE MG/l 1.3 0.9 3.2 0 0.4 0.7 0.3

Equipment Failure Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Roger Hanson

Chief Engineer's Weekly Summary

Starting Date 6-18-06 at 0001 hours
Ending Date 6-24-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	135	Hr	92168	Hr		gal	210	gal		gal/hr	1.55	gal/hr
Stbd. Main Engine	137	Hr	93245	Hr		gal	130	gal		gal/hr	0.95	gal/hr
Generator #1	158	Hr	51684	Hr		gal		gal		gal/hr		gal/hr
Generator #2	15	Hr	47845	Hr		gal		gal		gal/hr		gal/hr
Generator #3	168	Hr	55069	Hr		gal		gal		gal/hr		gal/hr
Boiler		Hr		Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week: 2020 | Avg. Kts./Hr. : 14.7 | Gal/Kt. Mi.: 13.9

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X1000	
Received													
Date	6-18	Place	KET		gal		gal		gal		gal	1	gal
Date	6-20	Place	BELL	33844	gal		gal		gal		gal	6	gal
Date	6-22	Place	KET		gal		gal		gal		gal	7	gal
Date	6-23	Place	SIT		gal		gal		gal		gal	4	gal
Date	6-24	Place	A-BAY		gal		gal		gal		gal	6	gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				33844	gal		gal		gal		gal		gal
On Hand 1 st Week				95585	gal	2153	gal	577	gal	3895	gal	103	gal
Total				129429	gal		gal		gal		gal		gal
Generated											1113	gal	
Sent Ashore				0	gal	0	gal	0	gal	0	gal		
On Hand End Week				101256	gal	1661	gal	577	gal	5008	gal	103	gal
Consumed				28173	gal	492	gal	0	gal			24	gal

COMMENTS. CI- 18 - 19 - 20 - 21 - 22 - 23 - 24 -
TOTAL MG/I 3.5 3.5 3.5 0.4 2.0 3.5 3.5
FREE MG/I 1.5 2.4 3.5 0 0.3 1.1 2.3

Equipment Failure Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 6-18-06 at 0001 hours
Ending Date 6-24-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	135	Hr	92168	Hr		gal	210	gal		gal/hr	1.55	gal/hr
Stbd. Main Engine	137	Hr	93245	Hr		gal	130	gal		gal/hr	0.95	gal/hr
Generator #1	158	Hr	51684	Hr		gal		gal		gal/hr		gal/hr
Generator #2	15	Hr	47845	Hr		gal		gal		gal/hr		gal/hr
Generator #3	168	Hr	55069	Hr		gal		gal		gal/hr		gal/hr
Boiler		Hr		Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week: 2020 | Avg. Kts/Hr. : 14.7 | Gal/Kt. Mi.: 13.9

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water X1000	
Received													
Date	6-18	Place	KET		gal		gal		gal		gal	1	gal
Date	6-20	Place	BELL	33844	gal		gal		gal		gal	6	gal
Date	6-22	Place	KET		gal		gal		gal		gal	7	gal
Date	6-23	Place	SIT		gal		gal		gal		gal	4	gal
Date	6-24	Place	A-BAY		gal		gal		gal		gal	6	gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				33844	gal		gal		gal		gal		gal
On Hand 1 st Week				95585	gal	2153	gal	577	gal	3895	gal	103	gal
Total				129429	gal		gal		gal		gal		gal
Generated										1113	gal		
Sent Ashore				0	gal	0	gal	0	gal	0	gal		
On Hand End Week				101256	gal	1661	gal	577	gal	5008	gal	103	gal
Consumed				28173	gal	492	gal	0	gal			24	gal

COMMENTS. CI- 18 - 19 - 20 - 21 - 22 - 23 - 24 -
TOTAL MG/I 3.5 3.5 3.5 0.4 2.0 3.5 3.5
FREE MG/I 1.5 2.4 3.5 0 0.3 1.1 2.3

Equipment Failure Yes ☐ No ☒ X
 (If "YES" include Report)

Chief Engineer Ray Justice

Chief Engineer's Weekly Summary

Starting Date 6-11-06 at 0001 hours

Ending Date 6-17-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	135	Hr	92,033	Hr		gal	160	gal		gal/hr	1.18	gal/hr
Stbd. Main Engine	135	Hr	93,108	Hr		gal	60	gal		gal/hr	.44	gal/hr
Generator #1	166	Hr	51,518	Hr		gal		gal		gal/hr		gal/hr
Generator #2	23	Hr	47,830	Hr		gal		gal		gal/hr		gal/hr
Generator #3	163	Hr	54,901	Hr		gal		gal		gal/hr		gal/hr
Boiler	14	Hr	38,841	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week: 2020 | Avg. Kts./Hr. : 14.96 | Gal/Kt. Mi.: 13.4

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water	
Received													
Date	6/11	Place	KTN		gal		gal		gal		gal	3,000	gal
Date	6/13	Place	BEL	33,600	gal	740	gal	255	gal		gal	9,000	gal
Date	6/15	Place	KTN		gal		gal		gal		gal	6,000	gal
Date	6/16	Place	SIT		gal		gal		gal		gal	3,000	gal
Date	6/17	Place	A-BAY		gal		gal		gal		gal	3,000	gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				33,600	gal	740	gal	255	gal		gal	24,000	gal
On Hand 1 st Week				99,178	gal	1,521	gal	295	gal	3,506	gal	100,000	gal
Total				132,778	gal	2,261	gal	550	gal	3,506	gal	124,000	gal
Generated										764	gal		
Sent Ashore & Via OWS				0	gal	0	gal	0	gal	350	gal		
On Hand End Week				105,685	gal	1,948	gal	550	gal	3,920	gal	103,000	gal
Consumed				27,093	gal	313	gal	0	gal			21,000	gal

COMMENTS. CI- 6/11 6/12 6/13 6/14 6/15 6/16 6/17
TOTAL MG/l 2.5 2.5 3.5 3.0 2.0 1.7 2.5
FREE MG/l 1.5 1.5 2.0 .5 .8 .9 .8

Rolls Royce tech. rep. Mike Butler aboard @ Bellingham 6/13/06 to adjust bow thruster controls. As we were docking at Ketchikan on 6/15/06 the bow thruster linkage cable broke inside its protective steel tubing. Next yard period we will remove this tubing to find out what caused the cable to fray and break.

Equipment Failure Yes ☒ No ☐

Chief Engineer Frank Czuba

Chief Engineer's Weekly Summary

Starting Date 6-4-06 at 0001 hours

Ending Date 6-10-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	138	Hr	91,898	Hr		gal	90	gal		gal/hr	.65	gal/hr
Stbd. Main Engine	138	Hr	92,973	Hr		gal	60	gal		gal/hr	.43	gal/hr
Generator #1	138	Hr	51,352	Hr		gal		gal		gal/hr		gal/hr
Generator #2	112	Hr	47,807	Hr		gal		gal		gal/hr		gal/hr
Generator #3	94	Hr	54,738	Hr		gal		gal		gal/hr		gal/hr
Boiler	12	Hr	38,827	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week: 2020 | Avg. Kts./Hr. : 14.64 | Gal/Kt. Mi.: 16.83

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water		
Received														
Date	6/6	Place	BEL	33,944	gal		gal		gal		gal	14,000	gal	
Date	6/9	Place	SIT		gal		gal		gal		gal	12,000	gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Total Received (Meter)					gal		gal		gal		gal	26,000	gal	
On Hand 1 st Week				103,135	gal	1,718	gal	418	gal	4,434	gal	100,000	gal	
Total				137,079	gal	1,718	gal	418	gal	4,434	gal	126,000	gal	
Generated											698	gal		
Sent Ashore & Via OWS				0	gal	0	gal	0	gal	1,626	gal			
On Hand End Week				99,178	gal	1,521	gal	295	gal	3,506	gal	100,000	gal	
Consumed				34,000	gal	197	gal	123	gal			26,000	gal	

COMMENTS. CI- 6/5 6/6 6/7 6/8 6/9 6/10

TOTAL MG/I 2.5 2.5 2.5 2.0 2.7 1.2

FREE MG/I .7 .35 1.5 .5 1.5 .2

6/4 vessel construction manager Doug Miller on board to check details of project plans

6/10 D Welsel & T Davidsor from Analytica aboard @ A bay to obtain MSD effluent samples

6/10 Bill Mygatt from Electric Power Systems aboard to troubleshoot bow thruster

Our bow thruster has caused power surges at start up lately. It is still being used as we investigate the problem.

Equipment Failure

Yes ☐ No ☒

(If "YES" include Report)

Chief Engineer Frank Czuba

Chief Engineer's Weekly Summary

Starting Date 5-28-06 at 0001 hours
Ending Date 6-3-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	133	Hr	91,760	Hr		gal	220	gal		gal/hr		gal/hr
Stbd. Main Engine	133	Hr	92,835	Hr		gal	90	gal		gal/hr		gal/hr
Generator #1	123	Hr	51,214	Hr		gal		gal		gal/hr		gal/hr
Generator #2	168	Hr	47,695	Hr		gal		gal		gal/hr		gal/hr
Generator #3	69	Hr	54,644	Hr		gal		gal		gal/hr		gal/hr
Boiler	18	Hr	38,815	Hr		gal				gal/hr		
Amos Hours updated? Yes N												

Miles this week: 2020 | Avg. Kts/Hr. : 15.12 | Gal/Kt. Mi.: 14.6

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water	
Received													
Date	5-30	Place	BEL	33,400	gal		gal		gal		gal	25K	gal
Date	6-02	Place	SIT		gal		gal		gal		gal	20K	gal
Date	6-03	Place	JNU		gal		gal		gal		gal	6K	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)				33,400	gal		gal		gal		gal	51K	gal
On Hand 1 st Week				99,178	gal	1948	gal	528	gal	1000	gal	103K	gal
Total				132,578	gal	1948	gal	528	gal	1000	gal	154K	gal
Generated										662	gal		
Sent Ashore				0	gal	0	gal	0	gal	0	gal		
On Hand End Week				103,135	gal	1718	gal	418	gal	1662	gal	100K	gal
Consumed				29,443	gal	230	gal	110	gal			54K	gal

COMMENTS. CI- 5/28 5/29 5/30 5/31 6/1 6/2 6/3

TOTAL MG/I 3.5 3.5 3.5 3.3 3.5 2.2 3.5

FREE MG/I 1.1 1.3 .4 1.6 .7 .9 .7

On Tuesday May 30, Mike Aholt from Beacon Services and Bud Trussell from AETC were aboard for a shipcheck on the upcoming refurbishment.

Equipment Failure

Yes ☐ No ☒

(If "YES" include Report)

Chief Engineer John Lockert

Chief Engineer's Weekly Summary

Starting Date 5-21-06 at 0001 hours

Ending Date 5-27-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	139	Hr	91,627	Hr		gal	60	gal		gal/hr		gal/hr
Stbd. Main Engine	139	Hr	92,702	Hr		gal	60	gal		gal/hr		gal/hr
Generator #1	154	Hr	51,091	Hr		gal		gal		gal/hr		gal/hr
Generator #2	165	Hr	47,527	Hr		gal		gal		gal/hr		gal/hr
Generator #3	18	Hr	54,575	Hr		gal		gal		gal/hr		gal/hr
Boiler	13	Hr	38,797	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week:2020 | Avg. Kts/Hr. : 14.53 | Gal/Kt. Mi.: 16.48

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water		
Received														
Date	5-21	Place	KTN		gal		gal		gal		gal	5K	gal	
Date	5-23	Place	BEL	33,280	gal		gal		gal		gal	5K	gal	
Date	5-25	Place	KTN		gal		gal		gal		gal	6K	gal	
Date	5-26	Place	SIT		gal		gal		gal		gal	1K	gal	
Date	5-27	Place	JNU		gal		gal		gal		gal	3K	gal	
Date		Place			gal		gal		gal		gal		gal	
Total Received (Meter)				33,280	gal		gal		gal		gal	20K	gal	
On Hand 1 st Week				99,934	gal	2124	gal	528	gal	796	gal	101K	gal	
Total				133,214	gal	2124	gal	528	gal	796	gal	121K	gal	
Generated											204	gal		
Sent Ashore				0	gal	0	gal	0	gal	0	gal			
On Hand End Week				99,178	gal	1948	gal	528	gal	1000	gal	103K	gal	
Consumed				34,036	gal	176	gal	0	gal			18K	gal	

COMMENTS. CI- 5/21 5/22 5/23 5/24 5/25 5/26 5/27
TOTAL MG/L 3.5 1.5 1.5 3.5 3.5 3.5 3.5
FREE MGL .7 .3 3.5 3.3 3.5 1.1 1.4

Equipment Failure

Yes ☐ No ☒

(If "YES" include Report)

Chief Engineer John Lockert

Chief Engineer's Weekly Summary

Starting Date 5-14-06 at 0001 hours
Ending Date 5-20-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	133	Hr	91,488	Hr		gal	90	gal		gal/hr	.68	gal/hr
Stbd. Main Engine	133	Hr	92,563	Hr		gal	60	gal		gal/hr	.45	gal/hr
Generator #1	103	Hr	50,937	Hr		gal		gal		gal/hr		gal/hr
Generator #2	100	Hr	47,362	Hr		gal		gal		gal/hr		gal/hr
Generator #3	124	Hr	54,557	Hr		gal		gal		gal/hr		gal/hr
Boiler	18	Hr	38,784	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week: 2,020 | Avg. Kts/Hr. : 15.19 Gal/Kt. Mi.: 15.62

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water	
Received													
Date	5/14	Place	KTN		gal		gal		gal		gal	7,000	gal
Date	5/16	Place	BEL	32,686	gal	890	gal		gal		gal	6,000	gal
Date	5/18	Place	KTN		gal		gal		gal		gal	4,000	gal
Date	5/19	Place	SIT		gal		gal		gal		gal	2,000	gal
Date		Place			gal		gal		gal		gal		gal
Date		Place			gal		gal		gal		gal		gal
Total Received (Meter)					gal		gal		gal		gal		gal
On Hand 1 st Week				98,802	gal	1,384	gal	528	gal	448	gal	99,000	gal
Total				131,488	gal	2,274	gal	528	gal	448	gal	118,000	gal
Generated											1,023	gal	
Sent Ashore & Via OWS				0	gal	0	gal	0	gal	675	gal		
On Hand End Week				99,934	gal	2,124	gal	528	gal	796	gal	101,000	gal
Consumed				31,554	gal	150	gal	0	gal			17,000	gal

COMMENTS. CI- 5/14 5/15 5/16 5/17 5/18 5/19 5/20 MSD EFFLUENT
TOTAL MG/L 3.5 3.5 3.5 3.5 3.5 3.5 3.5
FREE MG/L 3.0 3.4 2.7 3.0 2.0 1.5 .7

Three representatives of Harbor Marine Group were at Bellingham to check on projects planned for the next shipyard period. Paul Johnson, Scott Linzmeyer, Charlie Young and Stewart Emery came aboard in Juneau to work on the Amos system.

Equipment Failure Yes ☐ No ☒
(If "YES" include Report)

Chief Engineer Frank Czuba

Chief Engineer's Weekly Summary

Starting Date 05-07-06 at 0001 hours
Ending Date 05-13-06 at 2400 hours

Motor Vessel Malaspina

Equipment Status	Hours				Consumption				Rate			
	End week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine	136	Hr	91,355	Hr		gal	150	gal		gal/hr	1.1	gal/hr
Stbd. Main Engine	136	Hr	92,430	Hr		gal	120	gal		gal/hr	.88	gal/hr
Generator #1	145	Hr	50,834	Hr		gal		gal		gal/hr		gal/hr
Generator #2	106	Hr	47,262	Hr		gal		gal		gal/hr		gal/hr
Generator #3	79	Hr	54,434	Hr		gal		gal		gal/hr		gal/hr
Boiler	22	Hr	38,766	Hr		gal				gal/hr		
Amos Hours updated? Yes												

Miles this week: 2,020

| Avg. Kts./Hr. : 14.85

Gal/Kt. Mi.: 16.35

Liquid Status				FUEL (By Sounding)		Main Eng Lube		Aux Eng Lube		Oily Waste		Potable Water		
Received														
Date	5/7	Place	KTN		gal		gal		gal		gal	3,000	gal	
Date	5/9	Place	BEL	34,681	gal		gal	300	gal		gal	3,000	gal	
Date	5/12	Place	SIT		gal		gal		gal		gal	12,000	gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Date		Place			gal		gal		gal		gal		gal	
Total Received (Meter)				34,681	gal	0	gal	300	gal	0	gal	18,000	gal	
On Hand 1 st Week				97,149	gal	1,575	gal	215	gal	1,123	gal	100,000	gal	
Total				131,830	gal	1,575	gal	515	gal	1,123	gal	118,000	gal	
Generated											1,824	gal		
Sent Ashore				0	gal	0	gal	0	gal	2,499	gal			
On Hand End Week				98,802	gal	1,384	gal	515	gal	448	gal	99,000	gal	
Consumed				33,028	gal	191	gal	0	gal			19,000	gal	

COMMENTS. CI- 5/7 5/8 5/9 5/10 5/11 5/12 5/13 MSD effluent tested daily

Total MG/L 3.5 3.5 3.5 3.5 3.5 3.5 3.4

Free MG/L .085 3.0 1.5 .6 3.0 2.1 .02

E-gen is working and replacement part is on order. Can communicate with crew spaces from pursers counter using the PA system but not from the bridge.

Equipment Failure

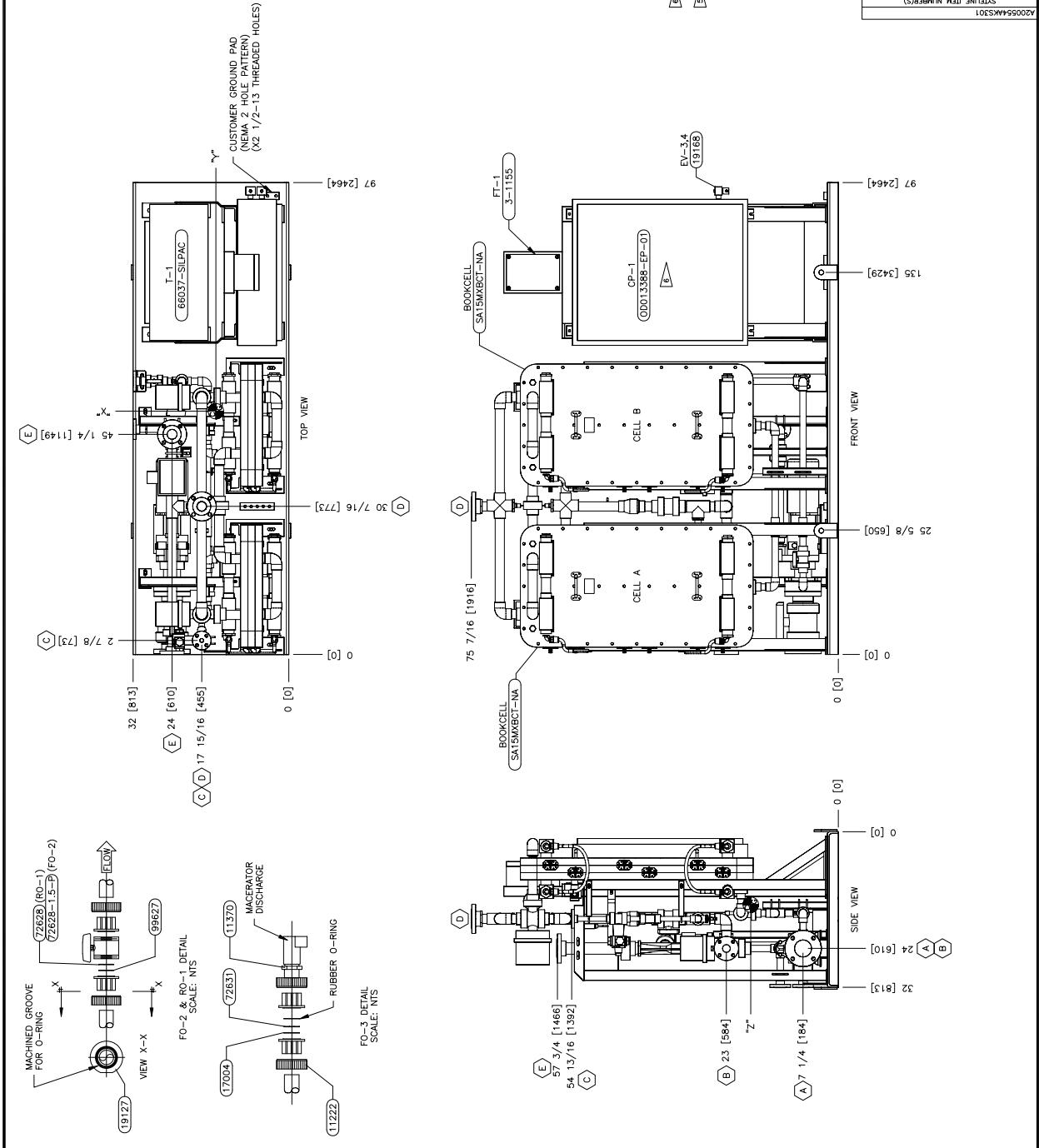
Yes ☐ No ☒

(If "YES" include Report)

Chief Engineer Frank Czuba

Appendix M

Schematic Layout – Double Bookcells (As on Aurora)



REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY
0	11/20/07	INITIAL RELEASE	TDR	SMA	SMA

#	DESCRIPTION	SIZE	RATING	MATERIAL
A	MACERATOR FEED	3"	150# FF	PVC
B	V-1 RETURN	1 1/2"	150# FF	PVC
C	SEAWATER INLET	3/4"	150# FF	PVC
D	EFFLUENT DISCHARGE FROM CELLS	2"	150# FF	PVC
E	AUTO BLOWDOWN	2"	150# FF	PVC
F	EFFLUENT BACKFLUSH FROM TANK	1"	150# FF	PVC
G	EMERGENCY OVERBOARD	1"	150# FF	PVC

CENTER OF GRAVITY LOCATIONS (NO OPTIONS)				
DESCRIPTION	APPROXIMATE UNIT WEIGHT ±2%	X	Y	Z
DRY	3460 Lbs. [1569 Kgs.]	50 [1270]	15 [381]	18 [457]
OPERATING	3550 Lbs. [1610 Kgs.]	50 [1270]	15 [381]	18 [457]

DIMENSION BASED OFF LEFT CORNER OF SKID (0.0.0)

7. HOISTING/LIFTING SHOULD BE PER STDN'S ERECTION & INSTALLATION GUIDELINES (TS-36), AND DRAWING NO: OM-LIFT-01.
8. PANEL INTEGRITY IS NEMA 4X.
9. MACERATOR PUMP FLEXIBLE COUPLING IS SECURED TO PIPING FOR UNIT TRANSPORT. COUPLING SHOULD BE INSTALLED AT PUMP AFTER CORRECT ROTATION HAS BEEN ESTABLISHED.
4. PIPING IS SCHEDULE 80 PVC AS STANDARD.
3. FINISH PER SPECIFICATION TS-25.
2. SKID IS ASTM A36 CARBON STEEL.
1. REFERENCE DRAWING D013388-F-01 FOR FLOW DIAGRAM.

NOTES (UNLESS OTHERWISE SPECIFIED)

SEVERN

TRENT

DE NORA

1110 INDUSTRIAL BOULEVARD SUGAR LAND, TEXAS 77478
PHONE NO: (281) 440-1100 FAX NO: (281) 266-9182
WWW.SEVERNDENORA.COM

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INCHES (MM)
FRACTIONS ± 1/2" 40.0
DECIMALS ± .005" 0.127
ANGLES ± 1°

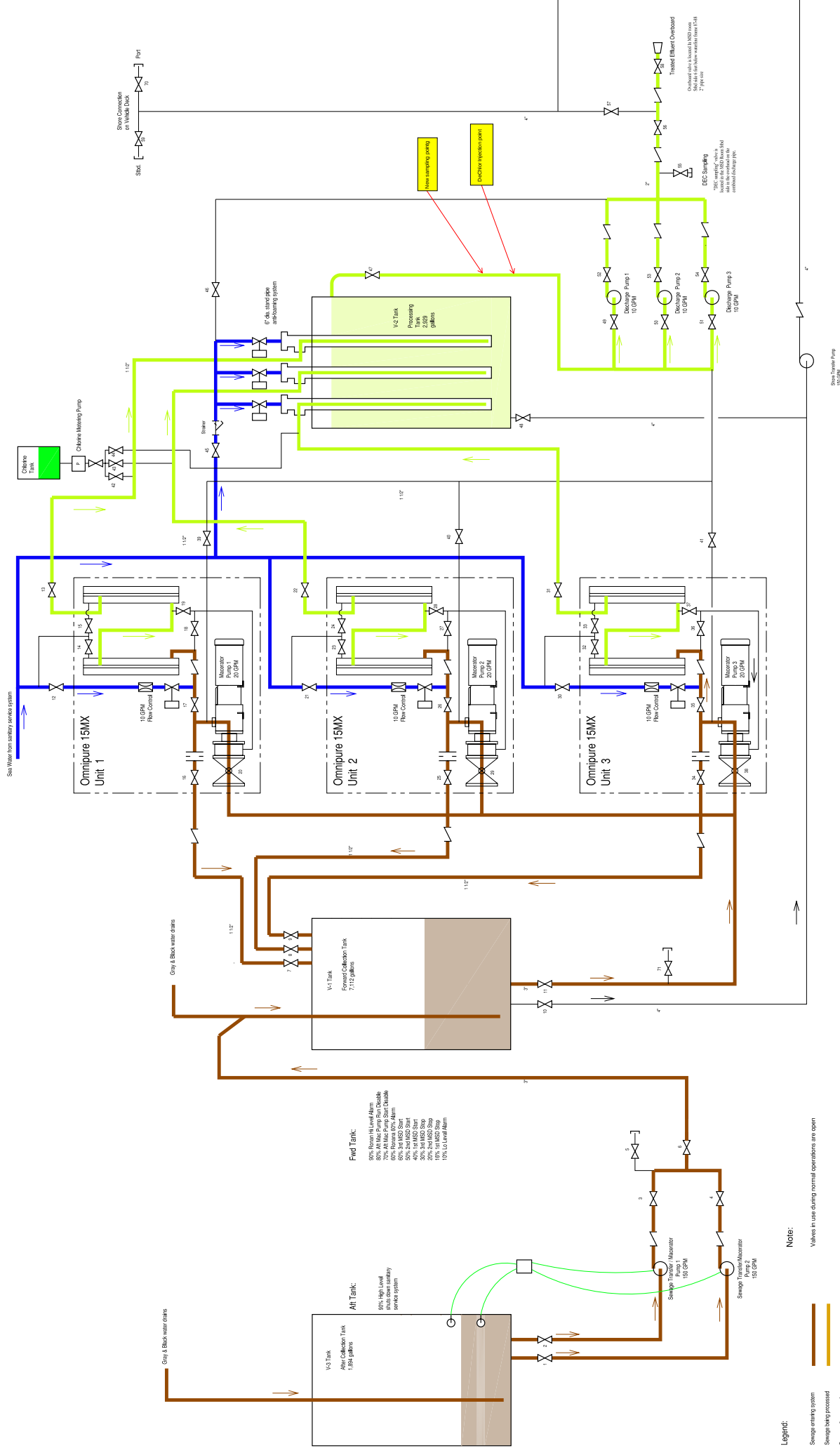
SCALE: 1/10
SIZE: REV: D 0
DWG NO: D013388-P-01
SHEET: 1 of 2

OMNIPURE

MARINE SANITATION DEVICE
U.S.C.G. CERT. NO. 159.015/7210/0
15MMPPM LOW SALINITY
GENERAL ARRANGEMENT
FAIRHAVEN SHIPYARD
AHH AUGORA
P.O. # D014866

Appendix N

Schematic Layout – De-Clor System



M/V Malaspina Waste Water System

Appendix P

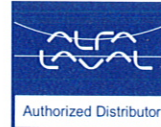
Alfa Tec Quotation Dated February 14, 2008P

QUOTATION

February 14th, 2008

To: Ravi Shankar
Harbor Marine Group

Subject: AMHS MSD Proposal's



Alfa Tec Inc.
4024 22nd Avenue West
Seattle, WA 98199
Tel: 206.281.9250
800.599.ALFA
Fax: 206.281.9258
www.alfatec.com

Thank you for contacting Alfa Tec Inc. for your Omnipure needs. We are pleased to offer the following estimate.

Detailed below are the various components for the AMH upgrade. This pricing is valid until 11 May 2008, after which it must be revalidated.

- 1. Control Panel:** New 15MXMP treatment skid control panel to allow control and operation of new Bookcells. The control panel will have an OIT operator interface terminal as the control device in place of individual switches. The OIT also replaces the usual status lights with a text message screen. The panel control logic is executed by a PLC with EPROM memory backup. The control panel provides DC power and control logic for the new, low salinity, multipass Bookcell arrangement. With the exception of the Bookcell controls, the operational philosophy of the system is generally the same as the existing relay logic panels.
- 2. 15MXMP Bookcells (2):** The new 15MX "Multipass" Bookcells are designed with smaller internal passages which increases internal liquid velocities to reduce seawater hardness deposit fouling. The new Bookcells also are fitted with three-way flow reversing valves that actuate each time the unit shuts down. The flow is reversed to provide a constant "backflush" effect when the unit operates. This further reduces the buildup of seawater hardness deposits and reduces manual maintenance requirements.
- 3. Low Salinity Operation:** The upgraded units will continue to operate even when the ship is in areas of low seawater salinity. When the existing (2) 12MX Bookcells are removed, space is available for (2) 15MXMP Bookcells. By use of these 2 larger Bookcells, the salinity requirement is approximately half of the original installation. The new control panel automatically controls this low salinity operation.
- 4. Treatment Flow Indication:** Ultrasonic flow indicators provide digital indication of unit flow rates and also have a resettable totalizer. The flow indicator also contains low flow contacts that signal the new control panel when proper flow is established. The indicators will be field mounted on each of the process module skids.

5. Collection Tank Level Control Panel: The “Lead / Lag” Level panel uses inputs from the existing level switches in the V1 collection tank to start and stop the Omnipure treatment skids. Surge capacity will be increased in the main and satellite collection points using the new level panel because the existing level logic arrangement does not make efficient use of the treatment system capabilities. Each treatment unit will be selectable as 1st start, 2nd start, etc.

6. De-Chlorination system: The DeClor system injects liquid sodium bisulphite (or dry sodium sulphite mixed with water) into the treated discharge stream to neutralize any residual chlorine excess to the treatment process. The DeClor system operates when any of the treatment skids are operating. The DeClor system consists of storage tank(s), control panel, residual analyzer/controller, injection pumps and piping fittings. All components are provided loose for mounting in place. The panel contains an Auto/Off switch, a red “Warning” light, a green “OK” light and a meter indicating residual sulfite (residual sulfite indicates all chlorine has been neutralized). There are (2) 100% injection pumps, one operating and one standby. The pumps inject sodium bisulphite into the suction pipe running from the V-2 tank to the overboard pumps. A probe will be fitted into the main discharge pipe before the overboard stop valve and the DEC sampling valve. This probe provides a feedback signal to the analyzer/controller. The analyzer/controller displays a millivolt reading indicating sulphite residual. The analyzer/controller also controls the speed of the injection pump to maintain residual Sulphite at a preset level to ensure no chlorine is discharged. The green light on the panel is a visual indication that there is NO chlorine present in the overboard discharge. The red light will show that chlorine is present.

7. Skid Piping: Various schedule 80 PVC pipe valves and fittings required to completely replace all on-skid piping assemblies during the Bookcell replacement. Includes cable & glands.

8. Documentation: General arrangement drawings and flow drawings are included sit the above equipment. Revised O&M manuals are also included. (3 per ship) A total “system drawing” is not included in this offer but could be provided in “as-built” form at an additional cost.

Pricing:

1. Control panel (1)	
15MXMP Bookcells with reversing valves (2)	
On-skid piping, valves, fittings, cable, etc. (3” valve not inc.)	
Ultrasonic Flow meter with display (1)	
Low Salinity operation is included with above parts	\$78,688.00 (per skid)
2. Dechlorination System (2 injection pumps, 1 controller)	\$18,589.00 (per ship)
3. Lead Lag Level Control Panel	\$11,040.00 (per ship)

4. Removal of old system
Installation of all of the above (Including misc fittings)
Testing of each unit \$7,590.00 (per skid)
5. SCP-1000 Macerator pumps (Columbia only) \$5,456.00 (per skid)
These pumps will replace the Hydromatics on the Columbia.
6. Training and operational placard posted in MSD rooms \$3,570.00 (per vessel)

Above prices do not include any travel expenses. Travel expenses will be billed at cost plus 20%.

Terms 50% down, balance after successful start up.

Again, thank you for contacting Alfa Tec Inc. If you have any questions or would like to schedule further service please call.

Sincerely,

Troy Bills

Troy Bills
Service Manager