Best Management Practices (BMP) Plan

M/V Columbia

BMP Registration No. *C0-011-2023*

Approved: 3 / 1 / 2023

Prepared by the
Alaska Department of Environmental Conservation

2023

BEST MANAGEMENT PRACTICE (BMP) PLAN
APPLICATION FORM

Alaska law prohibits each owner or operator of a small commercial passenger vessels (50 to 249 overnight passengers), from discharging wastewater into Alaska marine waters unless,

- the vessel obtains a discharge permit and meets the discharge permit requirements established in Alaska Statute[1] or
- the Department approves alternative terms and conditions[2], which allows operation under a Best Management Practices (BMP) Plan. BMPs include practices that protect the environment to the maximum extent feasible.

This is an application for Department approval to operate under alternative terms and conditions. Owners or operators must apply by submitting this form and the required Best Management Practices Plan for review[3] not later than **March 1** of each calendar year, except in a calendar year in which a DEC approved Best Management Practices plan is effective.

If an owner or operator fails to operate in accordance with their department approved BMP, the vessel discharges must then meet the requirements of AS 46.03.462 (e) and limitations on discharges established in AS 46.03.463(b), (c).

If you have questions, please contact Sam.Kito@alaska.gov or at 907-269-7542.

M/ V Columbia

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Box for ADEC use only:

☒ADEC Approved BMP on 3/1/2023

Bmp Plan Expires 5 years after this date.

[1] (AS 46.03.462, AS 46.03.463)
[2] (AS 46.03.462(k)
[3] Requirements described in **18 AAC 69.046**

Applicant Certification:

I certify that the *M/V Columbia* cannot practicably comply with the discharge permit requirements in Alaska Statute 46.03.462(e) 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 discharge permit requirements in AS 46.03.462(e) 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 discharge permit requirements in AS 46.03.462(e), the reasons why those costs are not practicable, and supporting information from vendors.
Signature: Anthony Karvelas

Printed Name: Anthony Karvelas	Date: 3/1/23

Contact Information for Person responsible for implementing the BMP Plan	
Responsible Person:	Anthony Karvelas
Email Address	Anthony.karvelas@alaska.gov
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Physical Address (if different)	Sarne as mailing
Telephone Number:	907-228- 7252
Facsimile Number:	907-228-6873

BMP Changes and Revisions

Revision Number	Date of Revision	Revision Description	Person Making Revision

Significant Changes - If any significant changes occur regarding vessels environmental systems, specifically the MSD systems, company environmental policies or updates to the Best Management Practices Plan (BMP), the BMP revision log will be updated, and an application will be submitted to ADEC CPVEC for reapproval.

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Transportation and Public Facilities

ALASKA MARINE HIGHWAY SYSTEM

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ALASKA MARINE HIGHWAY SYSTEM

BEST MANAGEMENT PLAN (BMP) FOR THE OPERATION AND MAINTENANCE OF MARINE SANITATION DEVICES ON THE *M/V* COLUMBIA

BMP Registration No.

Approved:

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M/V Columbia

Alaska Marine Highway System

7037 North Tongass Highway

Ketchikan, Alaska 99901-9101

Introduction

This Best Management Practices (BMP) Plan has been written and submitted to the Alaska Department of Environmental Conservation (ADEC) for the State of Alaska through the Department of Transportation and Public Facilities (DOT&PF) Alaska Marine Highway System (AMHS) to allow the M/ V Columbia to discharge under alternative terms and conditions as required by AS 46.03.46(c) and the Commercial Passenger Vessel Environmental Compliance (CPVEC) Program. This BMP Plan includes all the required information necessary to meet 18 AAC 69.046.

In addition to following the BMP Plan, AMHS vessels utilize the Vessel General Permit (VGP) Management Plan. The VGP Management Plan is intended to provide guidance to AMHS vessel personnel on the proper procedures to maintain compliance with the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES).

The VGP, issued by the EPA, regulates many vessels under one overall permit. The VIDA applies only to discharges incidental to the normal operation of a vessel, such as deck runoff and boiler blowdown. For AMHS vessels, this amounts to 26 types of vessel discharges plus one additional type of discharge for large ferries. In the State of Alaska, small cruise ships and state ferries (commercial passenger vessels capable of carrying 50 to 249 overnight passengers) do not fall under the Alaska Cruise Ship General Permit but are regulated under the VGP (commercial vessels greater than 79 feet in length and operating as a means of transportation). Please reference AS 46.03.490 (13).

By utilizing both the BMP Plan and the VGP Management Plan, AMHS personnel are better able to maintain compliance with State and Federal regulations governing vessel discharges.

Owner Statement

The State of Alaska through the DOT&PF's AMHS operates a fleet of 9 vessels, four of which are regulated by the ADEC's CPVEC Program. AMHS has been providing passenger and vehicle service since 1963. Two of the vessels *(M/ V Matanuska, M/V Malaspina)* started service in 1963. The other two, the *M/ V Columbia* and the *M/V Kennicott,* began service in 1974 and 1988 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 50 years.

AMHS vessels utilize self-contained Marine Sanitation Devices (MSDs) that meet the United States Coast Guard (USCG) Requirements of 33 CFR 159. The Omnipure units in use are USCG Type II certified and International Maritime Organization (IMO) approved for overboard discharge in territorial and international waters. The MSD systems were manufactured for smaller vessels and results have shown that these systems do not consistently meet the USCG Type II standards. There is not sufficient vertical space for the installation of newer Advanced Water Treatment Systems (AWTS), which require a larger footprint. Therefore, AMHS continues researching to find systems utilizing new technology that can physically fit on its vessels, meet USCG approval requirements, and meet the ADEC advanced treatment criteria. AMHS wastewater systems discharge frequently and have only collection tanks. There are sewage holding tanks on two 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 only used for sinks, showers, and food preparation. Saltwater 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 also be used for flushing toilets.

AMHS upgraded its MSDs between June 2009 and April 2011. Three vessels (M/V *Columbia, M/V Malaspina* and *M/ V Matanuska)* added new Omnipure 15MXMP multi-pass components and controls to the existing Omnipure 15 MX systems. These upgrades aligned all three vessels to a fleet standard that is important for the ease and safety of operating the equipment for engineers who are filling in for the vessel's usual engineering crew, or for engineers who are transferred from vessel to vessel.

Year ship joined fleet	1963
Passenger capacity (#) per voyage average operation < 249 pax (2021 Registration)	249
Max. Passenger capacity (#) per voyage maximum allowed	*499*
Crew capacity	*63*

MSD system (USCG type)	Omnipure 15MXMP – USCG Type II approval 159.015/7207/0. Each unit rated at 15,000 GPD
Maximum Hydraulic Load	3 units in parallel: 45,000 GPD
Vessel: Maximum Potential to Discharge	15,150 GPD (Total Crew/Passenger Capacity: 562
EPA: Maximum Potential to Discharge	9,120 (Total Crew /<250 Passenger Capacity:297
Daily Water Usage (Average Gray & Black)	30 GPD (22 fresh & 8 seawater)

BEST MANAGEMENT PRACTICES PLAN

Part 1 Current Discharge Practices [18 AAC 69.046(c)(1)]

The M/ V Columbia combines all black water and gray water drains. The sewage is processed through a USCG approved maceration/chlorination treatment system. The daily average volumes peak in summer months when the passenger traffic is at its highest. The daily average discharge volume is based upon estimate of the actual outflow, changing upon passenger load. The treatment system capacity is system capacity is 1,233 gallons per hour. No other material (oil, galley grease, cleaning products, or COVID sanitary disinfectant) is processed through the MSD system as it is considered hazardous material. The AMHS Safety Officer offloads these hazardous materials and maintains the AMHS hazardous waste records.

When in operation, the M/ V Columbia spends about 28% of its time in port and 72% of its time at sea.

Marine Sanitation Device Compliance Plan

AMHS personnel, the construction consultant, and the MSD supplier performed a ship inspection on the M/V Columbia while underway on December 20, 2009. Specifications were completed on January 4th, 2010, to include upgrading the existing MSD units with new MSD system “multi-pass” book cells, system control panel, collection tank, “lead/lag” control panel, de-chlorination system for operating in low- salinity waters, and equipment associated with enhanced cell reversal (backflushing) capability and reduction of chlorine output.

The Marine Sanitation Device (MSD) system is composed of three skid mounted Omnipure 15 MX modules along with their macerators, transfer and discharge pumps, control panels and a 3,927-gallon processing tank (V2) (See Figure 8). The ship's sewage comprises of gray water (interior 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 (12,567 gallon) collection

tank (V1) located in the MSD Room on the hold level, while the sewage from the vessel aft section is collected in the aft (15,206 gallon) collection tank (V3) located in the refrigeration machinery space of the hold level. Two sewage transfer pumps periodically pump the sewage from the V3 tank into the V1 tank. Each MSD unit processes sewage through multiple book cells. The raw sewage (influent) from the V1 tank is macerated / ground to fine particles and pumped through the four pairs of single book cells along with an equal quantity of seawater. The seawater facilitates the electrolytic action that creates the Sodium Hypochlorite, which in turn sanitizes the water. An automatic dechlorination system monitors the chlorine content and injects an appropriate amount of sodium bisulfite to remove the excess chlorine. The water from all MSD units is discharged to one tank (V2), where the treated water sits for a minimum of 30 minutes before being discharged overboard. When the V2 tank reaches a total chlorine level within permit requirements, the waste is pumped overboard.

The new system components added included the Omnipure 15MXMP multi-pass components and controls (see Figure 7). All pumps and controls were renewed. Most of the popping was replaced and the V1 aft collection tank was sand blasted and painted. The M/V Columbia came out of dry dock on May 31, 2010. The vendor spend five days solving a chlorinator problem in June of 2010. All warranty work was completed in the spring of 2011.

Marine Sanitation Device Maintenance & Inspections

Regular maintenance and inspection of the MSD units and associated components are scheduled in accordance with the vessel and fleet wide Preventive Maintenance System (PMS) and recorded in the AMHS Preventive Maintenance System (AMOS provided by SpecTEC). The sewage and graywater discharge log are maintained on the vessel for 1 year detailing each discharge. Daily, weekly, monthly, quarterly, semi-annual, and annual work orders must be carried out by assigned engineering personnel. Upon completion of the scheduled work, the engineer logs the work performed and provides any additional comments including the condition of the system, parts used, and any other general observations. The schedule is based on various factors, which include the type of maintenance to be conducted and the hours of operation of the equipment. Inspection and maintenance tasks are conducted on a regular basis and include checking for vibration, temperature, abnormal sounds, or other tell-tale signs of problems with the pumps and components.

- Book cells are back flushed twice daily with clean seawater to remove bound solids. The book cells are also cleaned on a weekly basis to further prevent sludge build up and promote efficient operation.
- The pumps are overhauled, at a minimum, annually during shipyard availability.
- The maceration equipment is maintained on a set schedule and are internally inspected monthly and overhauled annually.

Maintenance and inspections are based upon manufacturer's recommendations. Each work order includesa list of parts required to complete the job.

Marine Sanitation Device Chlorine Monitoring

AHMS has developed a policy to ensure that the MSD units are properly monitored. This policy includes:

- Daily testing of the wastewater total chlorine reading.
- Action is required by the crew if the chlorine readings are not in the range of 0 to 5

ppm.

- AMHS requires that if a zero reading is found, 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 an email providing information on what steps are being taken to resolvethe situation.
- If the effluent chlorine reading exceeds 5 ppm (mg/liter) the ship is instructed to takecorrective 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 wastewater. (Some operators feel it is helpful to pump the V2 processing tank back to the V1 forward collection tank to help reduce the cellulose mat buildup in the V2 tank.)
  - Discontinue use of chlorine bleach by the cleaning staff
  - Contact manufacturer for troubleshooting advice.
- A follow-up email is required to be sent to both the Port Captain and the assigned Port Engineer when the problem is solved.

The sample tap for total chlorine is in a different location on each vessel. This is due to the individual piping arrangement installed. Generally, the sampling port is in the overboard discharge line after the de-chlorination pump (see Figure 8). Each sampling port has a tag marked with "DEC Sampling" or similar language for easy identification. The crews use an EPA compliant Hach Pocket Colorimeter II or Hach Total Chlorine Test Kit (Model CN-65). An operating manual including test procedures and specifications for both methods are attached. The Pocket Colorimeter unit is zeroed as per the instructions prior to each use. The optimum reading should be above zero but below 0.5 ppm, as the lower chlorine levels are less harmful to sea life. An occasional zero is acceptable. A constant zero reading indicates a problem, which is to be repaired immediately.

Marine Sanitation Device Dechlorination

The dechlorination system, Orcachlor, operates in conjunction with the MSD sewage treatment systems. The automatic system monitors the chlorine content and injects an appropriate amount of sodium bisulfite powder to neutralize the chlorine content. The unit operates as a flow through device using filtered sea water requiring a salinity level of 19,000 ppm. The Orcachlor is connected downstream from the ship's filters and strainers. The outlet of the Orcachlor is piped to the backwash water line leading to the sanitary device. The water from all MSD units is discharged to one tank (V2) where the treated water sits for a minimum of 30 minutes before being discharged overboard. When the V2 tank reaches a total chlorine level within permit requirements, the waste is pumped overboard.

Spare parts for the dechlorination system are retained onboard. The spares are determined by Manufacturer's recommendations and operator experience. Items that are used more frequently are kept in greater quantity than original recommendations if feasible.

Marine Sanitation Device Sampling

In accordance with ADEC CPVEC program, the Quality Assurance Project Plan (QAPP) covers sampling and analysis for the parameters of Conventional and Priority Pollutants. The sampling of the vessel wastewater discharge is defined in the Vessel Specific Sampling Plan (VSSP). All

onboard sampling is conducted in accordance with the approved plans. The wastewater system is sampled once every three months of operation for Conventional parameters, once per season for Priority Pollutants, and once per year for Nutrients (for the first year of operation after MSD change or a layup of > 9 months). An independent laboratory samples and analyzes the treated effluent for each vessel. The vessels sampling schedule, per established sampling guidance, will be submitted to ADEC CPVEC prior to the operating season. The analytical results are reported to ADEC and to the AMHS Environmental Program Specialist. If there are any issues with sampling events, including a delayed or missed sampling event, ADEC will be contacted. If a sampling event is delayed or missed, AMHS staff will engage with the sampling contractor to reschedule at the earliest opportunity. Additionally, if sampling results deviate significantly from the expected results of being at or reasonably close to the permit standards corrective actions are taken. Once the corrective actions have been made, a sampling event will be scheduled for the earliest opportunity. The contracted company (lab) is required to share the preliminary sample results within three days after sampling including Fecal Coliform, Total Suspended Solids and Chlorine (Free & Total).

Due to relatively high bacteria count of fecal coliform and enterococci, along the coastline and in the port region of Ketchikan in 2019, it is in the best interest of AMHS Best Management Practice to minimize/stop/limit wastewater discharges within vessel operations during the summer months of high revenue service (May – September). Chief Engineers are to adjust their vessels current MSD operating regime to ensure the best possible adherence to these guidelines. Notification of entrance to, and departure from, controlled discharge areas will be communicated to the engineering department by the on-duty Bridge crew. Records are to be kept of the time of cessation and re-establishment of any overboard discharging that takes place in and around these controlled areas.

Area of Non-discharge Small Vessels under BMP Plan: Port of Ketchikan Alaska	
► AK Boundaries of Non-Discharge Area is between:	
South Boundary	Line from → *Gravina Point to Mountain Point*
North Boundary	Line from → *South of Guard Island*

Marine Sanitation Device Training & Reporting

The assigned Chief Engineer is responsible for implementing the BMP and the BMP training onboard the vessel. The training occurs with new engineering crew and regular updates are communicated to the crew onboard. As operators become familiar with the units and offshore maintenance is needed, additional items are added or the frequency of performing tasks increases as deemed appropriate by the Chief Engineer. Maritime engineers acquire Merchant Marine credentials including National and Standards of Training, Certification and Watching (STCW)* officer endorsements, and Ratings Forming Part of an Engineering Watch (RFPEW)** set forth by the USCG. The STCW are sets of qualification standards for personnel on seagoing ships (46 CFR 11.201). The RFPEW are a set of qualifications for the engine department on seagoing ships powered by main propulsion machinery of 750 k W propulsion power or more. Upon entry to a new position, individuals are assigned to a veteran crew member to learn the daily duties including, maintenance of the system, technical issues, sampling procedures, and all compliance regulations.

The Chief Engineers are ultimately responsible for tracking and reporting MSD maintenance, casualties, and test results. They designate a member of the engineering department to carry out the day-to-day maintenance of the units. Relief engineers overseeing operations may take too long 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, or supplied vendor drawings, of the wastewater system and marked each valve on the drawing with valve numbers. The valves aboard each vessel are labeled to correspond with the numbers on the drawings. A laminated drawing is posted in the MSD room and available to all operators. The installation of the same MSD equipment in three of the AMHS vessels will also minimize the time necessary for the relief engineers to learn the operation of the system.

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 the 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 ensure that procedures are being followed and that the effluent levels are appropriate.

In addition to the Chief Engineer's reports, each vessel is required to keep the following vessel- specific documents in an accessible cabinet in the MSD room.

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

Any MSD unit failure is reported to shoreside management as required by the Engineering Standard Operating Procedure (ESOP) for all system failures. The engineering department then begins troubleshooting and makes repairs within its capabilities. If the failure cannot be resolved with shipboard resources, outside resources will be utilized at the earliest possibility. Outside resources include Manufacturer's Technical Representatives, additional parts, or both. The Port Engineer, as the shoreside manager for the department, is responsible for coordinating these efforts. After the failure is rectified, any lessons learned will either result in individual training, department wide training, additional instructions in the ESOP, updates to maintenance, updates to operational procedures, or a combination of these as appropriate.

The AMHS long-term plan is to continue to research new technology to locate MSD units that will meet the advanced water treatment standards and fit within the space constraints aboard the vessels. The Governor of Alaska outlines amended legislation approximately every 3 years. AMHS reviews the amendments with DOT &PF Commissioner and Legislation Liaison. AMHS also coordinates with Glosten Naval Architect and Marine Engineering Company and the MSD manufacture to find more viable solution for the vessels.

Critical Wildlife Habitat Areas – No Transient Zones

AMHS does not transit areas that are designated as state refuges, state critical habitat

areas, or state sanctuaries as defined in AS 16.20, nor do AMHS vessels transit within 100 meters horizontally of mean lower low water (MLLW) of tidally affected portions of waters identified as important for spawning or rearing of anadromous fish.

*Note: Please reference: State Refuges, Sanctuaries and Critical Habitat Area KMLs, Alaska Department of Fish and Game

Herring Spawning occurs along the shoreline to a 20-meter water depth, measured vertically from the mean lower low water tidal datum. Only shallow draft vessels have the potential for entering the herring spawning areas and discharging wastewater.

*Note: Please reference: Southeast Alaska Herring Spawn Locations, Alaska Department of Fish and Game or ADEC Herring Spawning Areas in Alaska (2006)

Due to federally regulated navigational areas & security zones, all vessels in Alaskan waters are required to operate in accordance with the International Regulations for Prevention of Collisions at Sea, 1972 (72 COLREGS), also known as the Navigation Rules, per 33 CFR 80.1705.

Part 2 Summary of Test Results [18 AAC 69.046(c)(3)]

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 chlorine levels 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.

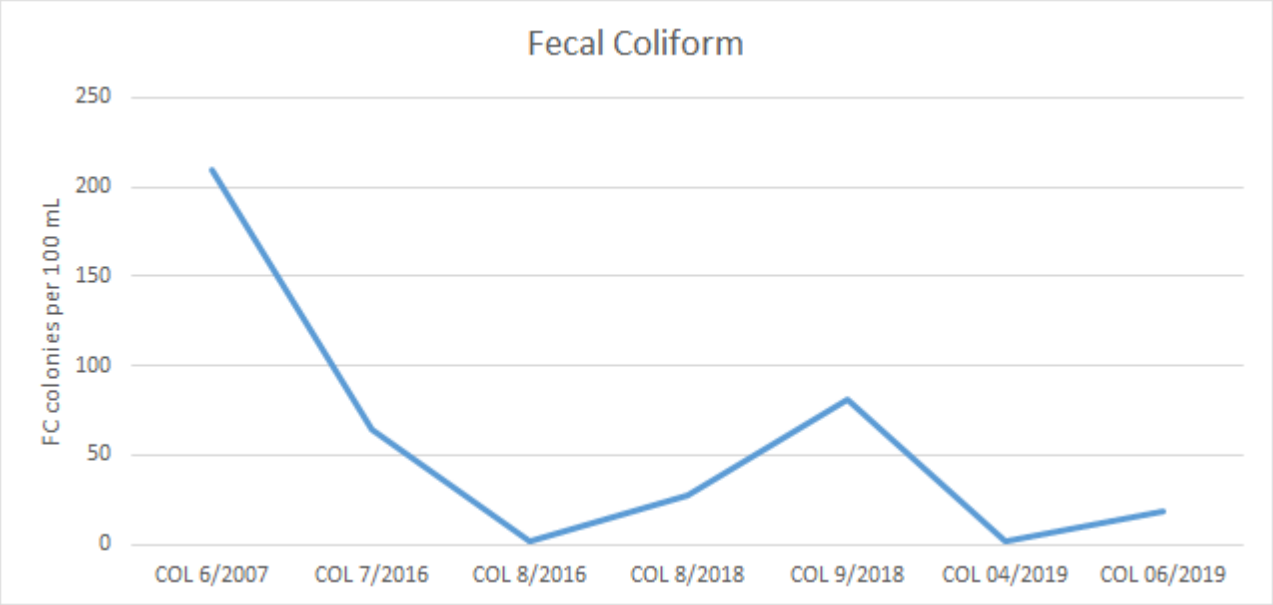
Part 3 Requirements for Vessels That Have Not Operated in Marine Waters of the State [18 AAC 69.046(c)(3)]

Table 1: MSD Unit Performance for 2016-2019 [18 AAC 69.046(c)(3)]

Parameter	COL 7/2016	COL 8/2016	COL 8/2018	COL 9/2018	COL 04/2019	COL 06/2019
Fecal Coliform (colonies/100ml)	64	1.64	27	81	2	18
Total Chlorine, Residual (mg/L)	0.15	6	<0.1	<0.1	<0.1	<0.1
Free Chlorine (mg/L)			<0.1	<0.1	<0.1	<0.1
Total Suspended Solids (mg/L)	26	11.9	65	215	30	20
Biological Oxygen Demand (mg/L)	47.1	10.3	100	180	83	23
Oil and Grease (ugL)l	3.4	2.06	NA	0	9.1	NA
Chemical Oxygen Demand (mg/L)	798	234	NA	1000	620	NA
Ammonia (mg/L)	4.86	0.05	NA	5.6	7.3	NA

Small Commercial Passenger Vessel/Alaska Water Quality Standards
Tested 2x per month (small commercial passenger vessels only tests 2x per season)
* Analyzed outside of hold time
** Analyzed outside of temperature limits
Exceeds WQS, Alaska or Federal secondary treament standards: Not a violation under BMP
NS: Not Sampled: Priority I and Priority II sampling regimes

Figure 1: Columbia Fecal Coliform Testing Data [18 AAC 69.046(c)(3)]



Part 4 Prohibition of Discharge While Traveling Less than 6 Knots [18 AAC 69.046(c)(4)]

Not applicable for this vessel.

Part 5 Discharge While Traveling Less Than 6 Knots [18 AAC 69.046(c)(5)]

M/ V Columbia is allowed to discharge sewage, gray water, or other wastewater while the vessel stationed at port, traveling at a speed of less than 6 knots or is located less than one nautical mile from the nearest shore abiding by the criteria in 5.1.

*Note: When proper infrastructure in provided in all coastal cities, vessels will be able to have the ability to the most practical extent to offload wastewater shoreside.

5.1 Prohibition of Discharge [18 AAC 69.046(c)(5)(A)]

A prohibition on the discharge of sewage, gray water, and other wastewater:

i. Within 100 meters horizontally of MLLW tidal datum of the tidally affected portion of a catalogued anadromous fish stream [18 AAC 69.046(c)(5)(A)(i)].

ii. Between March 1 and June 15 of each calendar year, within waters that are a depth of 20 meters vertically of MLLW tidal datum, and that are identified in the department's set of maps entitled Herring Spawning Areas of Alaska, dated November 2005, and adopted by reference [18 AAC 69.046(c)(5)(A)(ii)]; and

iii. Within areas designated under AS 16.20 as refuges, sanctuaries, or critical habitat areas under AS 16.20 [18 AAC 69.046(c)(5)(A)(iii)].

Protection of the Environment [18 AAC 69.046(c)(5)(B)]

Protect the environment to the maximum extent feasible by:

iv. Reducing the amount of sewage, gray water, or other wastewater discharges identified in Part 1 of this subsection to the maximum extent practicable [18 AAC 69.046{c)(5)(B)(i)]

v. Improving the quality of sewage, gray water, or other wastewater discharged by reducing the fecal coliform bacteria and residual chlorine included under Part 2 or 3 of this subsection to the maximum extent practicable [18 AAC 69.046(c)(5)(B)(ii)].

vi. Minimizing the risk to human health caused by exposure to the vessels sewage, gray water, or other wastewater discharges [18 AAC 69.046(c)(5)(B)(iii)].

vii. Dispersing sewage gray water, or other wastewater discharged into the marine waters of the state to the maximum extent practicable [18 AAC 69.046(c)(5)(B)(iv)].

Part 6 Crew and Passenger Training Programs [18 AAC 69.046(c)(6)]

Training Plan

The Chief Engineer was trained on the operation and maintenance of the new equipment by the vendor at the time of installation. He has written manuals for the purpose of training relief engineers. The manuals are in the process of being updated with pictures and step-by-step instructions. A training video DVD has been produced and will teach relief engineers who have never worked with the Omnipure system . The DVD will include the following:

- Safety and the proper use of personal protective equipment
- How to acid clean the cell probes in the chlorine generator
- Maintenance schedules and operation pertaining to:
  - Inspections
  - Chlorine testing
- Tips on pump overhauls and proper seal replacement
- Where inventory and parts manuals can be found and how to access them.

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 may have some difficulty in ensuring that MSDs are operated to their maximum efficiency. However, the installation of the same equipment on three of the vessels will minimize the need for cross training for engineers who are filling in for the vessel's usual engineering crew or for engineers who are transferred from vessel to vessel. AMHS believes that the procedures put in place will further alleviate this problem and that a structured training program is not necessary at this time. If there are problems with specifically relief engineers, we will address their competency on an individual basis. The Chief Engineer is responsible for ensuring that the MSD operating personnel have the knowledge necessary to operate the systems correctly onboard their assigned vessel. The Chief Engineer of each vessel will conduct individual crewmember training necessary to maintain optimum operation of the MSD system.

Water Reduction Plan

An integral part of the Best Management Practices is the Water Reduction Plan. Signs are posted in all restrooms and staterooms encouraging passengers and crews to minimize water usage. Exact sign language varies from vessel to vessel and location to location. Announcements are made to the same effect, especially when in port. Crewmembers are trained to be aware of any leaking valves that may increase water usage and repair them in a timely manner. Frequent routine checks are conducted on any device that has the potential to leak thus affecting water usage.

Part 7 Recordkeeping Practices [18 AAC 69.046(c)(7)]

Communications Plan

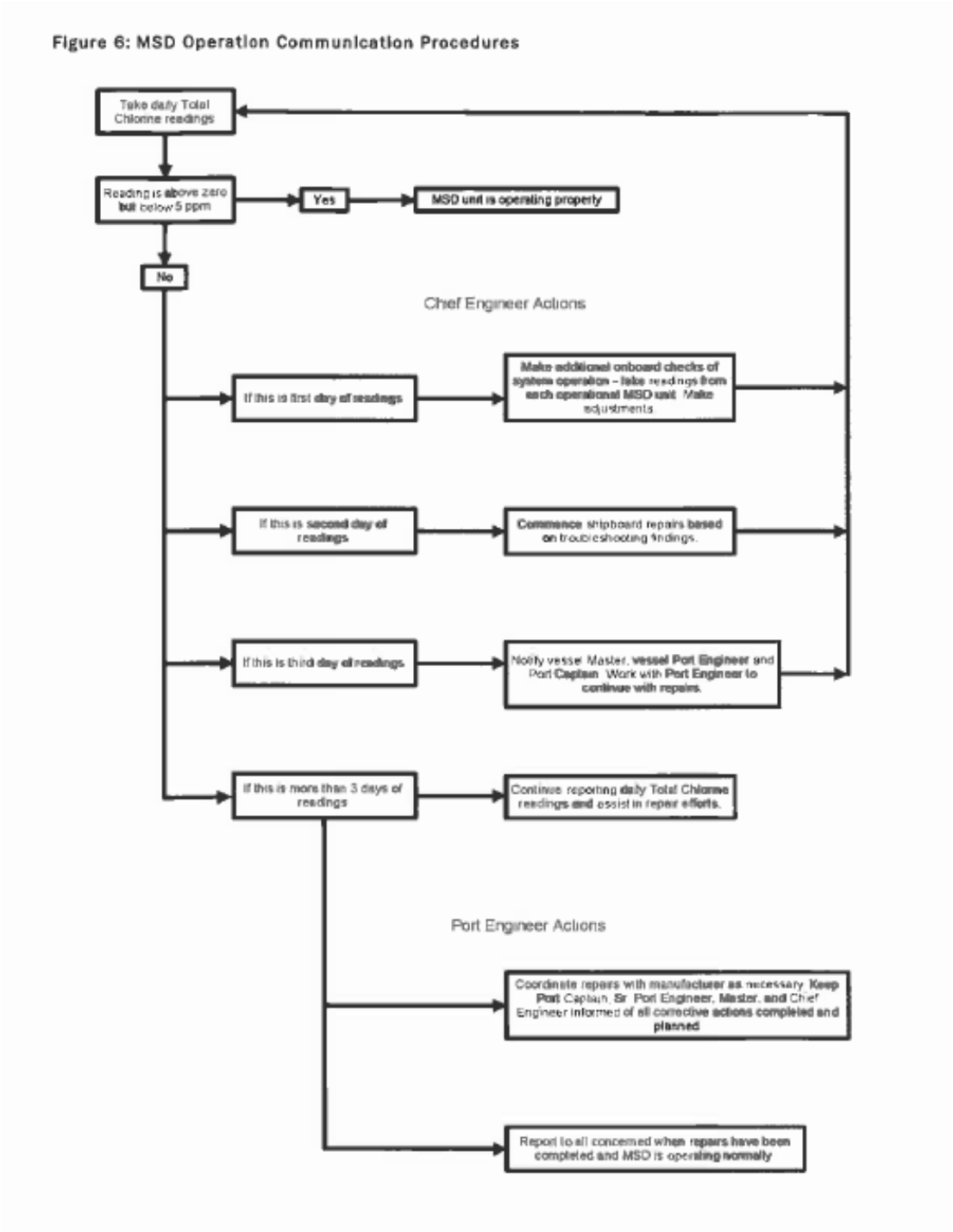
AMHS has implemented the following communications procedures to ensure that the proper operation of the MSD units on each ship is communicated to the ultimate decision makers.

- The AMHS Environmental Officer is responsible for the fleet wastewater program.
- The Chief Engineer on each vessel is responsible for that vessel's shipboard wastewater 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:
    - Identifying the problem.
    - What is being done to correct it.
    - Email notification when the 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 to increase compliance. This information will be used by the Engineering Manager and the General Manager in developing the upcoming budget.

Figure 2: MSD Operation Communication Procedures



Recordkeeping

AMHS has implemented the following recordkeeping examples to ensure that the properdocumentation of the MSD units on each ship is communicated to the ultimate decision makers.

Table 2: Sample Wastewater Discharge Log for M/V Matanuska

M/V COLUMBIA WASTEWATER DISCHARGE LOG										Calculations Area	
		Continuous Discharge System based on 1.25 gals/person/hour								Use Alaska times only.	
		DISCHARGE FROM MSD OVERBOARD LINE, STARBOARD SIDE									
Date	**Start Time**	**From (port)**	**To (port)**	**Hours (at sea)**	**In Port**	**Hours (in port)**	**Number of Crew plus Passengers**	**Gallons Wastewater Discharged**	**AVG SPEED NMPH**	Port Arrival Date	Port Arrival Time

*GPH per person is an estimate of the actual outflow, changing upon passenger load. Hours (at sea) x Hours (in port) x crew/pax # x1.25.

Table 3: Latitude and Longitude of Ports: SE Alaska Example

SE ALASKA	
BELLINGHAM	48-43.39N, 122-30.81W
PRINCE RUPERT	54-17.32N, 130-21.91W
KETCHIKAN	55-20.56N, 131-39.12W
METLAKATLA	55-07.06N, 131-32.84W
WRANGELL	56-28.47N, 132-23.49W
PETERSBURG	56-48.51N, 132-58.54W
KAKE	56-57.73N, 133-55.32W
ANGOON	57-28.36N, 134-34.09W
TENAKEE	57-46.76N, 135-13.16W
SITKA	57-02.99N, 135-20.73W
AUKE BAY/JUNEAU	58-22.93N, 134-41.05W
HAINES	59-16.88N, 135-27.55W
SKAGWAY	59-26.93N, 135-19.51W
HOONAH	58-07.34N, 135-27.38W
GUSTAVUS	58-27.33N, 135-53.19W
PELICAN	57-57.57N, 136-13.79W
YAKUTAT	59-32.91N, 139-44.03W

Table 4: Distance of Port: Example

DISTANCE BETWEEN PORTS		
Port	Port	Distance NM
Akutan	Unalaska	45
Akutan	Cold Bay	158
Angoon	Hoonah	63
Angoon	Tenakee	35
Bellingham	Ketchikan	595
Bellingham	Seymour Narrows	156

Figure 3: Sample Chief Engineer's Weekly Summary Log

Chief Engineer's Weekly Summary

Columbia

Starting Date _____ 0001 Hours

Ending Date _____ 0001 Hours

Equipment Status	Hours				Consumption				Rate			
	End Week		Grand Total		Fuel Oil		Lube Oil		Fuel Oil		Lube Oil	
Port Main Engine		Hr		Hr		Gal		Gal		gal/hr		gal/hr
Starboard Main Engine		Hr		Hr		Gal		Gal		gal/hr		gal/hr
#1 Generator		Hr		Hr		Gal		Gal		gal/hr		gal/hr
#2 Generator		Hr		Hr		Gal		Gal		gal/hr		gal/hr
#3 Generator		Hr		Hr		Gal		Gal		gal/hr		gal/hr
Boiler		Hr		Hr		Gal				gal/hr		
Bow Thruster		Hr		Hr								
Emergency Generator		Hr		Hr								
Miles		MPG		GPM			MPH			GPH		

Liquid Status		Fuel		Main Eng. Lube		Aux Eng Lube		Oily waste		Potable Water	
Date	Place										
			Gal		Gal		Gal		Gal		Gal
			Gal		Gal		Gal		Gal		Gal
			Gal		Gal		Gal		Gal		Gal
			Gal		Gal		Gal		Gal		Gal
			Gal		Gal		Gal		Gal		Gal
			Gal		Gal		Gal		Gal		Gal
Total Received			Gal		Gal		Gal		Gal		Gal
On Hand 1st Week			Gal		Gal		Gal		Gal		Gal
Total			Gal		Gal		Gal		Gal		Gal
Generated									Gal		
Sent Ashore			Gal		Gal		Gal		Gal		
On Hand End Week			Gal		Gal		Gal		Gal		Gal
Consumed			Gal		Gal		Gal				Gal

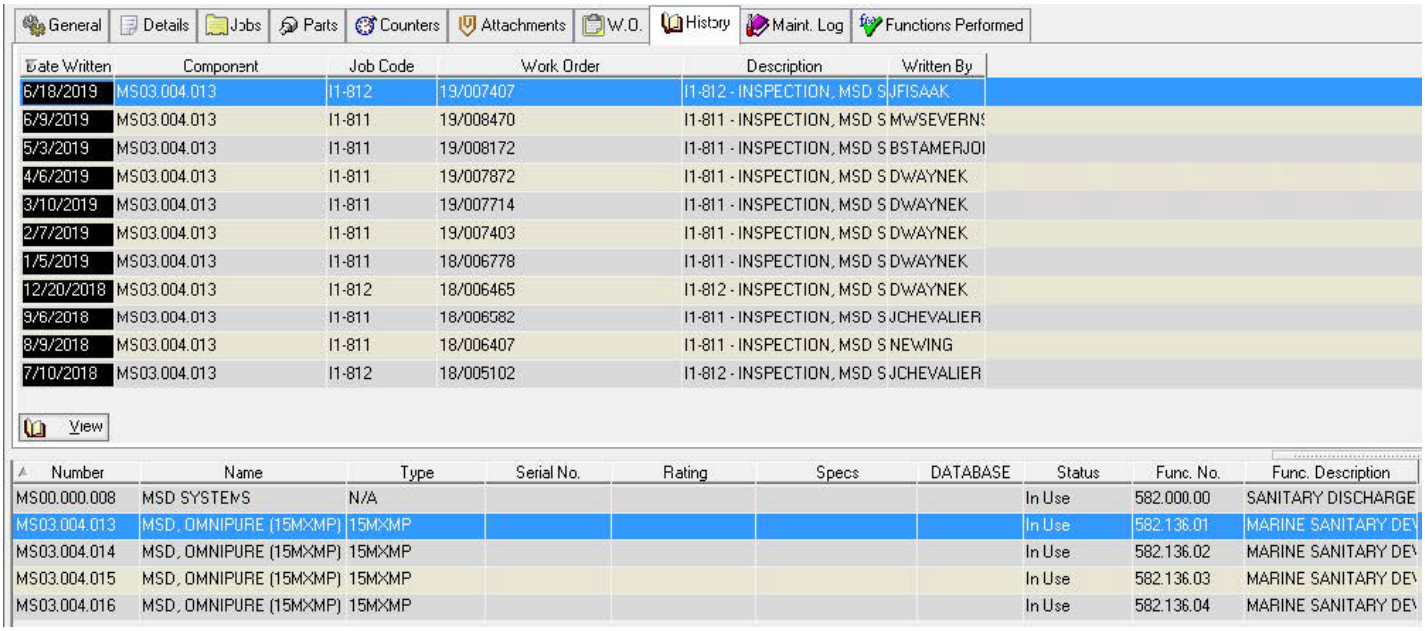
MSD effluent Total Cl Mg/l SU MO TU WE TH FR SA

Comments:

Equipment Failure Yes ☐ No ☐

Chief Engineer _____

Figure 4: Sample MSD History AMOS Report (2019). There was no MSD/Effluent discharged from 2019-2022. Pumping wastewater to Vigor Shipyard for shoreside treatment via the City of Ketchikan.



Appendix A: USCG Certificate of Inspection and Port Engineer's Certification Statement Letter

Figure 5: USCG current Certificate of Inspection (18 AAC 69.046(b)(3)).

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

Certification Date: 31 May 2022
Expiration Date: 31 May 2023

Certificate of Inspection

For ships on international voyages this certificate fulfills the requirements of SOLAS 74 as amended, regulation I/14, for a SAFE MANNING DOCUMENT.

Vessel Name	Official Number	IMO Number	Call Sign	Service
COLUMBIA	557340	7320095	WYR2092	Passenger (Inspected)

Hailing Port	Hull Material	Horsepower	Propulsion
KETCHIKAN, AK UNITED STATES	Steel	10800	Diesel Reduction

Place Built	Delivery Date	Keel Laid Date	Gross Tons	Net Tons	DWT	Length
SEATTLE WA UNITED STATES	31Dec1974	01Jan1974	R-3646 I-13009	R-2663 I-4932		R-378.8 I-376.8

Owner
STATE OF ALASKA
DEPT OF TRANSPORTATION & PUBLIC FACILITIES
7037 NORTH TONGASS HIGHWAY
KETCHIKAN, AK 99901-9101
UNITED STATES

Operator
STATE OF ALASKA
DEPT OF TRANSPORTATION & PUBLIC FACILITIES
7037 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 15 Certified Lifeboatmen, 0 Certified Tankermen, 0 HSC Type Rating, and 0 GMDSS Operators.

0 Masters	0 Licensed Mates	1 Chief Engineers	2 Oilers
0 Chief Mates	0 First Class Pilots	0 First Assistant Engineers	1 Patrolman
0 Second Mates	0 Radio Officers	0 Second Assistant Engineers	
0 Third Mates	4 Able Seamen	0 Third Assistant Engineers	
1 Master First Class Pilot	2 Ordinary Seamen	2 Licensed Engineers	
2 Mate First Class Pilots	0 Deckhands	0 Qualified Member Engineer	

In addition, this vessel may carry 600 Passengers, 71 Other Persons in crew, 0 Persons in addition to crew, and no Others. Total Persons allowed: 686

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).

AN HOURLY PATROL OF THE VEHICLE DECK SHALL BE MAINTAINED IN ADDITION TO THAT REQUIRED BY 46 CFR 78.30-10.

ONE APPROVED CHILD-SIZE LIFE PRESERVER SHALL BE PROVIDED FOR EACH PERSON ON BOARD WEIGHING LESS THAN NINETY (90) POUNDS.

SEE NEXT PAGE FOR ADDITIONAL CERTIFICATE INFORMATION

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

Annual/Periodic/Re-Inspection

Date	Zone	A/P/R	Signature

This certificate issued by:
J. DALE LCDR, USCG, By Direction
Officer in Charge, Marine Inspection
Southeast Alaska
Inspection Zone

Dept. of Home Sec., USCG, CG-841 (Rev 1-2000)(v2) OMB No. 2115-0517

Figure 5: USCG current Certificate of Inspection (18 AAC 69.046(b)(3)) continued.

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

Certification Date: 31 May 2022
Expiration Date: 31 May 2023

Certificate of Inspection

Vessel Name: COLUMBIA

ALL WATERTIGHT DOORS IN SUBDIVISION BULKHEADS SHALL BE KEPT CLOSED AT ALL TIMES EXCEPT DURING USE.

THE VESSEL MAY TRANSPORT THOSE HAZARDOUS MATERIALS SPECIFIED IN DEPARTMENT OF TRANSPORTATION EXEMPTION LETTERS DOT-E 7485, 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 FOUR (4) PERSONS ON BOARD THE VESSEL ARE ASSIGNED AND QUALIFIED TO OPERATE EACH INSTALLED FAST RESCUE BOAT. THE MASTER SHALL ENSURE THAT THE FAST RESCUE BOAT IS OPERATED WITH AT LEAST (2) PERSONS QUALIFIED IN ITS OPERATION.

---Sea Valves/Chests---

Next Exam	Last Exam
30Nov2026	16Nov2021

---Marine Evacuation System---

EQUIPMENT	Next Deployment	Last Deployment
#1 SLIDES (STBD)	31Dec2024	12Dec2018
#2 SLIDES (PORT)	31Dec2023	10Oct2019

---Hull Exams---

Exam Type	Next Exam	Last Exam	Prior Exam
DryDock	31May2023	16Nov2021	27Jan2020
Internal Structure	31May2023	16Nov2021	27Jan2020

---Stability---

Type	Issued Date	Office
Book	11Jul2016	Marine Safety Center (MSC)
Letter	11Jul2016	Marine Safety Center (MSC)

--- Inspection Status ---

Fuel Tanks

	Internal Examinations		
Tank ID	Previous	Last	Next
6 DB-FUEL CENTER	12Dec2018	16Nov2021	30Nov2026
6 SDL-FUEL PORT	12Dec2018	16Nov2021	30Nov2026
6 SDL-FUEL STBD	12Dec2018	16Nov2021	30Nov2026
7 DB-FUEL CENTER	12Dec2018	16Nov2021	30Nov2026
7 DB-FUEL POT	12Dec2018	16Nov2021	30Nov2026
7 DB-FUEL STBD	12Dec2018	16Nov2021	30Nov2026
8 DB-FUEL CENTER	12Dec2018	11Nov2021	30Nov2026
8 DB-FUEL PORT	12Dec2018	11Nov2021	30Nov2026
8 DB-FUEL STBD	12Dec2018	11Nov2021	30Nov2026

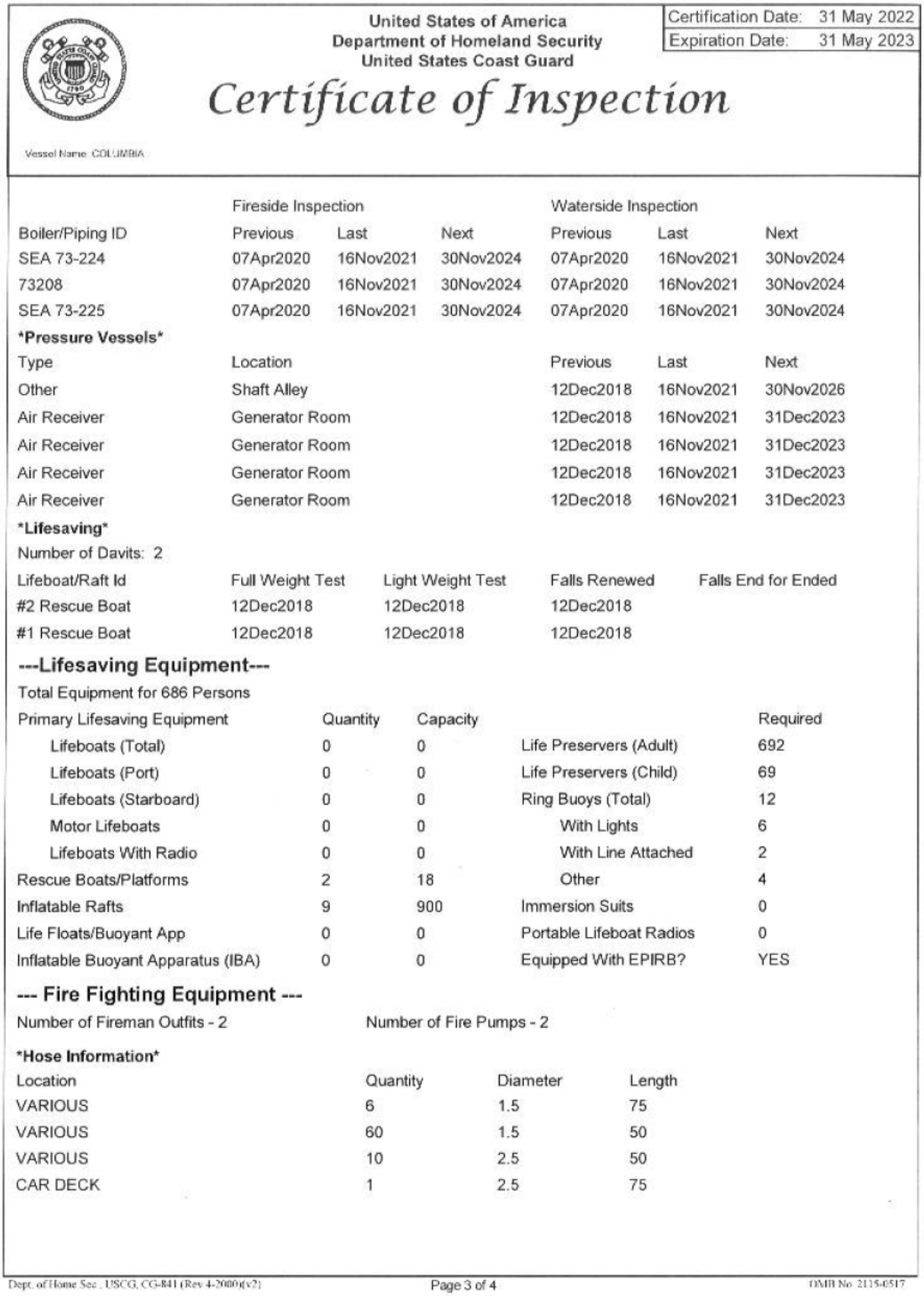
Boilers/Steam Piping

Maximum Steam Pressure Allowed: 150

	Hydro Inspection			Mountings Inspection	
Boiler/Piping ID	Previous	Last	Next	Opened	Removed
SEA 73-224	07Apr2020	16Nov2021	30Nov2024	12Dec2018	13Mar2013
73208	07Apr2020	16Nov2021	30Nov2024	12Dec2018	15Mar2013
SEA 73-225	07Apr2020	16Nov2021	30Nov2024	12Dec2018	13Mar2013

Dept. of Home Sec., USCG CG-841 (Rev 4-2000)(v2) Page 2 of 4 OMB No. 2115-0517

Figure 5: USCG current Certificate of Inspection (18 AAC 69.046(b)(3)) continued.



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

Certification Date: 31 May 2022
Expiration Date: 31 May 2023

Certificate of Inspection

Vessel Name: COLUMBIA

	Fireside Inspection			Waterside Inspection		
Boiler/Piping ID	Previous	Last	Next	Previous	Last	Next
SEA 73-224	07Apr2020	16Nov2021	30Nov2024	07Apr2020	16Nov2021	30Nov2024
73208	07Apr2020	16Nov2021	30Nov2024	07Apr2020	16Nov2021	30Nov2024
SEA 73-225	07Apr2020	16Nov2021	30Nov2024	07Apr2020	16Nov2021	30Nov2024

Pressure Vessels

Type	Location	Previous	Last	Next
Other	Shaft Alley	12Dec2018	16Nov2021	30Nov2026
Air Receiver	Generator Room	12Dec2018	16Nov2021	31Dec2023
Air Receiver	Generator Room	12Dec2018	16Nov2021	31Dec2023
Air Receiver	Generator Room	12Dec2018	16Nov2021	31Dec2023
Air Receiver	Generator Room	12Dec2018	16Nov2021	31Dec2023

Lifesaving

Number of Davits: 2

Lifeboat/Raft Id	Full Weight Test	Light Weight Test	Falls Renewed	Falls End for Ended
#2 Rescue Boat	12Dec2018	12Dec2018	12Dec2018	
#1 Rescue Boat	12Dec2018	12Dec2018	12Dec2018	

---Lifesaving Equipment---

Total Equipment for 686 Persons

Primary Lifesaving Equipment	Quantity	Capacity		Required
Lifeboats (Total)	0	0	Life Preservers (Adult)	692
Lifeboats (Port)	0	0	Life Preservers (Child)	69
Lifeboats (Starboard)	0	0	Ring Buoys (Total)	12
Motor Lifeboats	0	0	With Lights	6
Lifeboats With Radio	0	0	With Line Attached	2
Rescue Boats/Platforms	2	18	Other	4
Inflatable Rafts	9	900	Immersion Suits	0
Life Floats/Buoyant App	0	0	Portable Lifeboat Radios	0
Inflatable Buoyant Apparatus (IBA)	0	0	Equipped With EPIRB?	YES

--- Fire Fighting Equipment ---

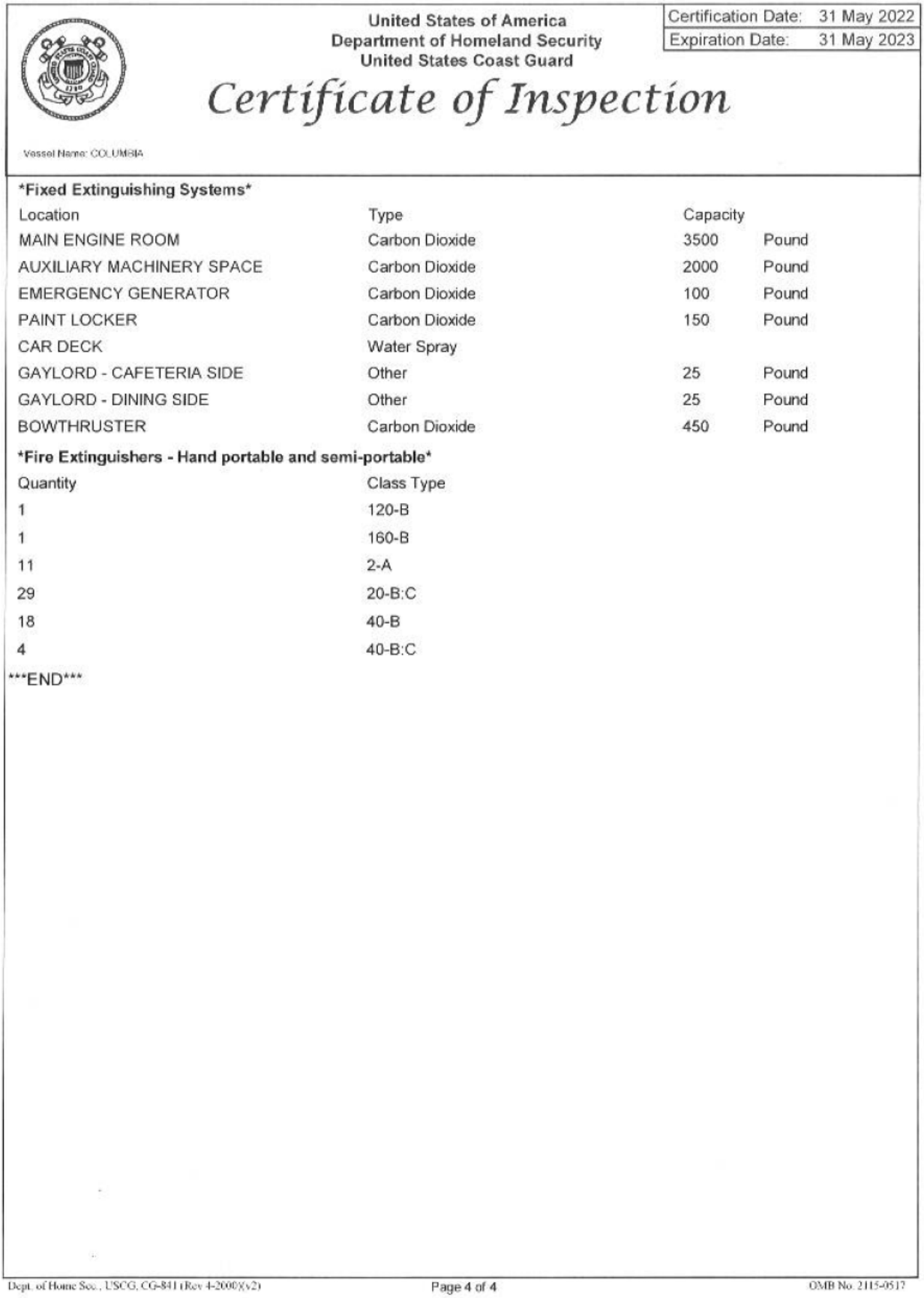
Number of Fireman Outfits - 2 Number of Fire Pumps - 2

Hose Information

Location	Quantity	Diameter	Length
VARIOUS	6	1.5	75
VARIOUS	60	1.5	50
VARIOUS	10	2.5	50
CAR DECK	1	2.5	75

Dept. of Home Sec., USCG, CG-841 (Rev 4-2000)(v2) Page 3 of 4 OMB No. 2115-0517

Figure 5: USCG current Certificate of Inspection (18 AAC 69.046(b)(3)) continued.



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

Certification Date: 31 May 2022
Expiration Date: 31 May 2023

Certificate of Inspection

Vessel Name: COLUMBIA

Fixed Extinguishing Systems

Location	Type	Capacity	
MAIN ENGINE ROOM	Carbon Dioxide	3500	Pound
AUXILIARY MACHINERY SPACE	Carbon Dioxide	2000	Pound
EMERGENCY GENERATOR	Carbon Dioxide	100	Pound
PAINT LOCKER	Carbon Dioxide	150	Pound
CAR DECK	Water Spray		
GAYLORD - CAFETERIA SIDE	Other	25	Pound
GAYLORD - DINING SIDE	Other	25	Pound
BOWTHRUSTER	Carbon Dioxide	450	Pound

Fire Extinguishers - Hand portable and semi-portable

Quantity	Class Type
1	120-B
1	160-B
11	2-A
29	20-B:C
18	40-B
4	40-B:C

END

Dept. of Home Sec., USCG, CG-841 (Rev 4-2000)(v2) Page 4 of 4 OMB No. 2115-0517

Figure 6: Engineer's Certification Statement Letter 2021 (18 AAC 69.046(b)(3)).

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Transportation and Public Facilities
ALASKA MARINE HIGHWAY SYSTEM
7037 North Tongass Highway
Ketchikan, Alaska 99901-9101
Main: 907.228.6829
Fax: 907.228.6876
dot.alaska.gov

July 27h, 2021

Sarah Mutter
Compliance and Enforcement Program
Alaska Department of Environmental Conservation
P.O Box 111800
Juneau, Alaska 99811

Marine Sanitation Devices (MSD) Upgrade – *M/V Columbia*

The following information is submitted as supportive documentation in the application for the Alaska Marine Highway System "Best Management Practices Program" per 18 AAC 69.046(b)(4)(A), toward certifying that, for physical and economic reasons the *M/V Matanuska* is unable to practicably comply with the standard terms and conditions in AS 46.03.462(b).

Prior to January 2010, the *M/V Columbia* MSD system was comprised of four skid mounted on Omnipure 15 MX module along with their macerators, transfer and discharge pumps, control panels and a processing tank. A contract was awarded in February 2010 for $ 605,000 to upgrade the system. The work was started in March 2010 and completed in May 2010. The new system components are Omnipure 15 MX multi-pass components and controls. All pumps and controls were renewed. Most piping was renewed and the V1 sewage tank was blasted and painted. At the end of the shipyard period, crewmembers were trained on the systems operation and maintenance. The addition of the new equipment improved the MSD system and made it consistent with the other vessels,*M/V Matanuska and M/V Malaspina.*

The upgrades have been made to improve the efficiency of the MSD system in order to comply with the State of Alaska (SOA) discharge standards. AMHS will continue to modify and upgrade the existing system with the expectations that the effluent continues to improve and meet SOA standards. At the current time, this is the most practical approach taking into consideration the best technology available for the *M/V Columbia* and the space limitations aboard the vessel.

Sincerely,

Cisco Flores
Marine Engineering Manager
Alaska Marine Highway System
cisco.flores@alaska.gov

"Keep Alaska Moving through service and infrastructure."

Appendix B: Omnipure 15 MXMP MSD Brochure and System Schematic

Figure 7: Omnipure 15MXMP Marine Systems Brochure Excerpt

We Understand Offshore Sewage Treatment

OMNIPURE™ Treatment Process

The processing function of every OMNIPURE unit is the same — regardless of size. The automatic treatment process for generating oxidant on-demand is simple and proven effective. Operation is 24/7, with continuous collection and treatment of the accumulated black and gray water.

- Raw sewage is collected via gravity into the system's V-1 influent collection tank.
- The OMNIPURE unit oxidizes and disinfects raw sewage by means of an electrochemical reaction in the unit's bookcell.
- After the slurry of sewage and seawater has been electrolyzed in the bookcell, the stream is routed into the OMNIPURE unit V-2 residence tank.
- The V-2 tank is sized to provide the required retention time to assure that any remaining bacteria will be exposed to the produced hypochlorite and killed.
- After retention in the V-2 tank, the effluent overflows from the top of the V-2 tank to the sea, via gravity. If this discharge point is below a vessel's waterline, the V-2 tank discharge is routed to an on-board centrifugal overboard discharge pump for discharge to the sea.

OMNIPURE™ Benefits and Certifications

Benefits:

- Effective electrolytic wastewater treatment
- Treats both black and gray water
- Patented, certified process
- Compact and lightweight with short retention periods
- Low maintenance
- No dangerous chemical additives
- No odors
- No screens or growth media to clean
- No filters
- No sludge
- No dilution required
- No microorganisms to maintain
- No additional tanks required
- 26-plus years of field installation experience

Equipment Certifications:

- International Maritime Organization (IMO) Resolution MEPC.2 33 CFR 59
- United States Coast Guard (USCG) Type Test Certified
- Certified for use in Hazardous Areas per NEC 501-1 of NFPA 70 (CL.1, C/D, Div.2)
- China Classification Society No. NYT02610001
- Russian Maritime Register of Shipping No. 97.143.009
- Certified by Nationally Recognized Testing Laboratory (NRTL)
  - UL508A
  - UL73
  - NFPA 70, UL1604 and NFPA 496
  - UL698A
  - CSA 22.2 14-95
  - Applicable sections of Article 500 of the National Electric Code (NEC)

Figure 7: Omnipure 15MXMP Marine Systems Brochure Excerpt (continued)

Automated Maintenance OMNIPURE Units

The OMNIPURE™ 12MXMP and 15MXMP units offer the same treatment capacities as the high capacity MX series units but include enhanced automated maintenance features. The OMNIPURE 18MXMP is only offered with the automated maintenance features, it is not available as an MX series unit.

For applications requiring larger unit sizes, operators find it beneficial to install systems requiring less frequent manual maintenance. The MXMP models offer the benefit of longer, continuous on-line operation between required manual maintenance duties.

These enhanced features include:
- Automated V-2 blowdown
- Automated cell flow reversal
- Enhanced bookcell electrolyzer design permits higher throughput flow velocity through the treatment cell, enhancing the scouring effect of the flow

Automated Maintenance OMNIPURE® Design Specifications		12MXMP	15MXMP	18MXMP
Personnel Complement (Maximum)[1]	Black Water Only	250	500	525
	Black & Gray Water	110	225	240
Treatment Ratings (Maximum)[2]	Treatment Volume: l/day (gal/day)	28,390 (7,500)	56,000 (14,794)	60,000 (15,842)
Dimensions &Weights	Length: mm (inches)	2,616 (103)	3,607 (142)	3,657 (144)
	Width: mm (inches)	1,219 (48)	1,372 (54)	1,372 (54)
	Height†: mm (inches)	2,870 (113)	3,073 (121)	3,225 (127)
	Dry Weight: kg (pounds)	1,500 (3,300)	3,045 (6,700)	3,340 (7,363)
	Operating Weight: kg (pounds)	4,033 (8,895)	7,994 (17,624)	8,040 (18,386)
	V-1 Volume: liters (gallons)	1,476 (390)	2,945 (778)	3,236 (855)
	V-2 Volume: liters (gallons)	1,170 (309)	2,271 (600)	2,498 (660)
Utility Requirements	Power (KVA)**	21	24	24
	Seawater: l/min (g/min)	28.39 (7.5)	47.32 (12.5)	51.10 (13.5)

[1]Personnel complement provided for reference only. System sizing to be based on daily hydraulic loadings as determined by actual field data where available.
[2]100% peak capacity. DNWT recommends that actual operational capacities not exceed 90% of maximum capacity. Units should be sized based on daily hydraulic loading, not number of persons.
**All electrical ratings assume normal operating conditions at normal seawater salinity levels.
†Denotes overall height including unit sprayhead device.

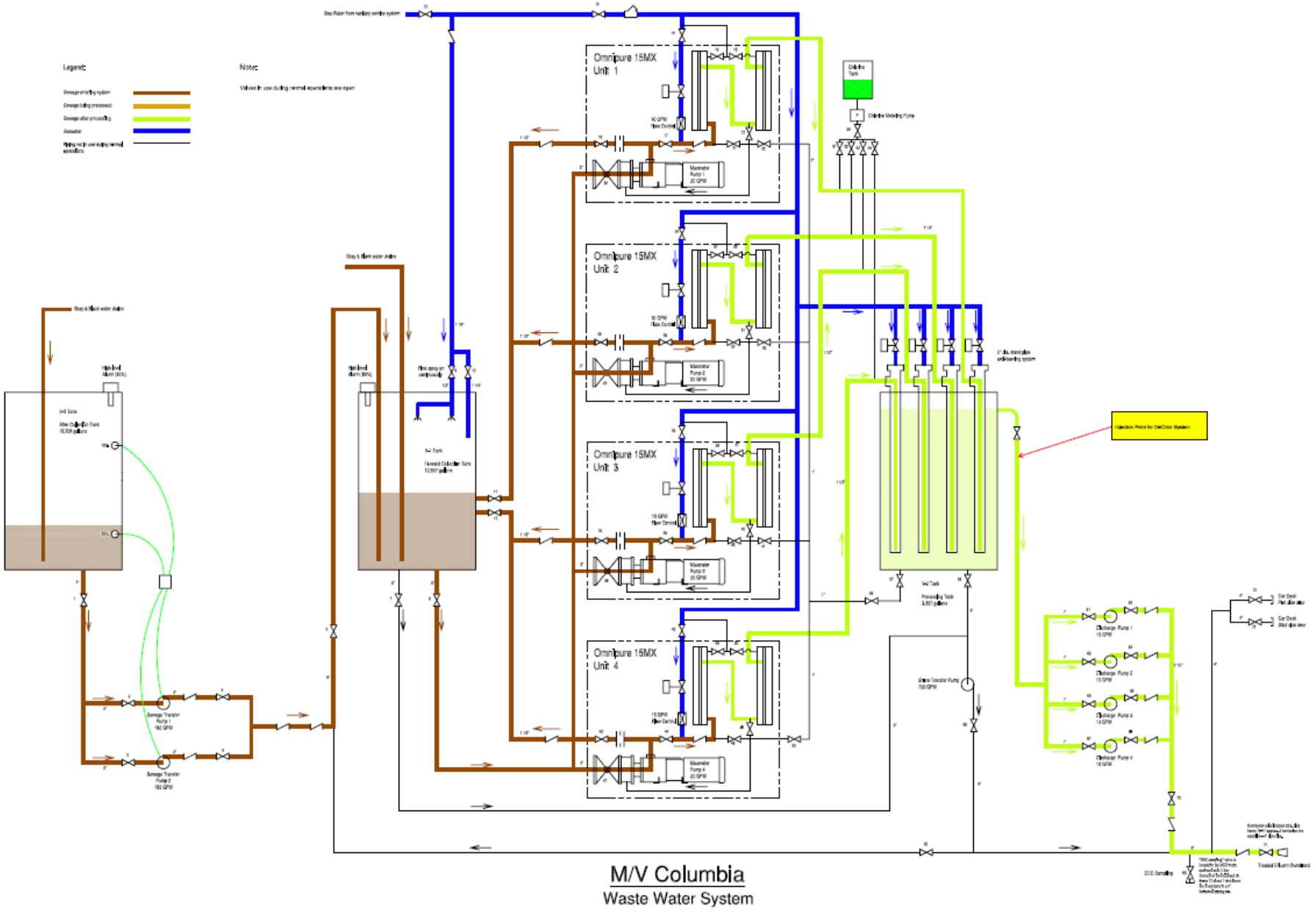
All information is subject to change at the discretion of De Nora Water Technologies.

OMNIPURE™ 12MC

OMNIPURE™ 12MXMP

OMNIPURE™ 15MXMP

Figure 8: M/V Columbia Wastewater System Schematic



Appendix C: MSD Maintenance Procedures and Chlorine Test Procedures

Omnipure Marine Sanitation Device

MSD Maintenance

Every Watch: make rounds, visually check for any leaks. If there is a minor leak at a seal, make a note and keep an eye on it. If water (liquid/sewage) is draining out while the system is not running, then you will have to secure the unit, do a drain down, and prepare to exchange the pump with one that is ready to go.

Safety: Must Wear Proper PPE!
When you acid clean, open a treatment unit, or remove the window on the V-1 to wash it out – please wear full PPE. This includes a full-face respirator, poly lab coat, gauntlet sleeve gloves, and a poly-coated Tyvek hood.

Daily:

- Test chlorine & adjust as needed. Log in the E.C.C's Logbook in the lower L/H corner & the MSD's chlorine log. The DEC will request these logs during inspections. Please keep all readings including Daily, Weekly & Monthly logbooks.
- Inspection for leaks, piping, and pumps.
- Keep the MSD room clean & sanitized. Do a spray down and wash down.
- **AMOS**: make sure to make daily, weekly & monthly entries.
- Fill out Daily notes & the MSD Chlorine Logbook.

Weekly:

- Disinfect the MSD room at least (3) a week to keep the bilge well pockets cleaned out.
- **AMOS**: Make weekly entries

Monthly:

- **AMOS**: Make monthly entries.
- **Safety and Protective Gear (PPE)**: Full-face respirator, cartridges (2 sets per week minimum) 3-M only. Lab aprons "poly", gauntlet sleeve gloves (Grainger – stock up), Vinyl inspection gloves (better than Nytril gloves). Keep up on the stock and be SAFE.

MSD Safety Supply locker located in the baggage room as you enter thru the watertightdoor #4. Keep it locked!

Bellingham: see the Bellingham Sewage Hook Up instructions

MSD Chlorine Test Procedure

- Identify the Unit to be tested.
- Make sure all other units are off and not able to come on during your sample taking. This will ultimately affect your chlorine test.
- Wait until the unit being testing has cycled OFF.
- In the Auto & Time mode operation, cycle the Auto switch to manual and back to Auto quickly. This will cycle the transfer pump ON once it comes up to the Level Probe inside the Treatment Tank.
- Start your 14–15-minute count at this point.
- Flush the sample port prior to taking the sample.
- At minute 14 take your sample from the overboard pipe at the deep sink.
- Pour sample to the 40 mil. Mark
- Add (1 each) Reagent No. 1 to the sample & swirl. The sample should turn dark, indicating there is chlorine.
- Add Reagent No. 2 to the same sample & swirl.
- The test tube level should be full – not concaved or overfilled.
- Invert the square test bottle over the test tube and invert both, emptying the test tube into the square test bottle.
- Use the test drops, one drop at a time, swirling between each drop. Watch the dark colordisappear. Each drop = 1 ppm.
    - If the sample is almost clear but not totally & you fill the tube with less than a whole drop which makes the sample completely clear, this would = 0.5 ppm.
- Fill out the MSD logbook and enter the Chlorine reading in the ships log (lower left-hand corner).

Appendix D: Sampling Information and Field Notes

Sampling Information

Admiralty Environmental
641 W. Willoughby Ave., Suite 301
Juneau, AK 99801
(907) 463-4415

Alaska Marine Highway System Sampling Field Notes

Date: _____

Vessel Name: _____

Sampler(s): _____

Sample Port ID #1: _____ (Grab / Composite) (Blackwater / Graywater / Mixed)

Notes: _____ Total time of sample collection (min): _____

Latitude: N/A **Longitude:** N/A **Speed:** N/A **Itinerary:** _____

Sample Port ID #2: _____ (Grab / Composite) (Blackwater / Graywater / Mixed)

Notes: _____ Total time of sample collection (min): _____

Latitude: **Longitude:** **Speed:** **Itinerary:** _____

Sample Port ID #3: _____ (Grab / Composite) (Blackwater / Graywater / Mixed)

Notes: _____ Total time of sample collection (min): _____

Latitude: **Longitude:** **Speed:** **Itinerary:** _____

pH meter ID / Date Calibrated	Thermometer ID / Date Calibrated	Colorimeter ID / Date Calibrated

Field Test Results	#1	#2	#3
Time, 24-hour	:	:	:
pH, units			
Temp, C			
Free Chlorine, mg/L			
Total Chlorine, mg/L			

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 *Printed Name* *Date*

Admiralty ENVIRONMENTAL

Admiralty Environmental
641 W. Willoughby Ave., Suite 301
Juneau, AK. 99801
(907) 463-4415

CHAIN OF CUSTODY/TRANSMITTAL RECORD
PAGE 1 OF 1

PROJECT NAME:		ADEC Compliance	
REPORT TO:	PHONE#:	# of Bottles	
ADDRESS:	SAMPLED BY:		
Samples taken in the presence of:			

Initial Temp. (°C)
Small Temp. Blank: _____
Large Temp. Blank: _____

DATE	TIME	SITE DESCRIPTION/IDENTIFIER	MATRIX	Field Results: pH	Temp °C	Total Cl	Free Cl

DATE	RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	DATE
TIME	RELINQUISHED BY: (print)	RECEIVED BY: (print)	TIME
DATE	RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	DATE
TIME	RELINQUISHED BY: (print)	RECEIVED BY: (print)	TIME

Section to Be Completed by Receiving Laboratory

Temp °C/Loc:	_____	_____	_____	_____
Thermo ID#:	_____	_____	_____	_____
Condition of Custody Seals	_____	_____	_____	_____
Initialed By:	_____	_____	_____	_____
Shipped Via:	_____	_____	_____	_____