Glosten

22 AUGUST 2023 | FILE NO. 20059.06 | REV. -

2023 FLEET CONDITION SURVEY

M/V MATANUSKA.

PREPARED FOR ALASKA MARINE HIGHWAY SYSTEM

STATE OF ALASKA
49 TH
COLIN J. FLYNN
ME 131174
REGISTERED PROFESSIONAL ENGINEER

Digitally Signed 22-Aug-2023

PREPARED	CHECKED	APPROVED
Digitally Signed 22-Aug-2023	Digitally Signed 22-Aug-2023	Digitally Signed 22-Aug-2023
SUSAN M. FITZGERALD	COLIN J. FLYNN, PE	DAVID W. LARSEN, PE
TECHNICAL EDITOR	PROJECT MANAGER	PRINCIPAL-IN-CHARGE

Revision History

Section	Rev	Description	Date	Approved
All	-	Preliminary release.	8/22/2023	DWL

Table of Contents

Section 1 Introduction 1
1.1 Fleet Condition Survey Program 1
1.2 Vessel Description 1
1.2.1 Regulatory Information 1
1.3 Vessel Condition 4
1.3.1 Reporting Methodology 4
1.3.2 Recommendations 5
1.4 Cost Summary 11
1.5 Completed Recommendations and SMRs 11
Section 2 Structure and Coatings 13
2.1 Underwater Hull 14
2.2 Tanks, Voids, and Bilges 15
2.3 Topsides 16
2.4 Superstructure 18
Section 3 Spaces 21
3.1 Vehicle Space 21
3.2 Passenger Habitable Spaces 23
3.2.1 Passenger Staterooms 23
3.2.2 Passenger Lounges and Dining Areas 24
3.2.3 Public Passageways, Foyers, and Lobbies 26
3.2.4 Public Heads 28
3.2.5 Solarium 30
3.3 Crew Habitable Spaces 31
3.3.1 Officer Staterooms 31
3.3.2 Crew Staterooms 33
3.3.3 Crew Heads 35
3.3.4 Crew Messes and Lounges 35
3.4 Crew Workspaces 36
3.4.1 Galley 36
3.4.2 Offices 37
3.4.3 Lockers and Dry Stores 38
3.4.4 Workshops 39
3.4.5 First Aid Room 39

3.5 Engineering and Control Spaces 40
3.5.1 Pilothouse and Wing Stations 40
3.5.2 Engineer's Operating Station 40
3.5.3 Main Machinery Room 41
3.5.4 Auxiliary Machinery Room 41
3.5.5 Emergency Generator Room 42
3.5.6 Bow Thruster Room 42
3.5.7 Steering Gear Room 42
3.5.8 MSD Room 43
3.5.9 Shaft Alley 43
3.5.10 Fan Rooms 43
3.5.11 Exhaust Stack 45
Section 4 Fire and Safety Equipment 47
4.1 Fire Boundaries and Insulation 47
4.1.1 Doors - Fire, Fire Screen, Weathertight, and Watertight 47
4.1.2 Structural Fire Protection 47
4.1.3 Fire Dampers 48
4.2 Fire Suppression Systems and Piping 48
4.2.1 Automatic Sprinkler System and Piping 48
4.2.2 Manual Deluge Sprinkler System and Piping 50
4.2.3 Firemain System 50
4.2.4 Engine Room Suppression System 51
4.2.5 Emergency Generator Suppression System 52
4.2.6 Paint Locker Suppression System 52
4.2.7 Galley Suppression System 52
4.3 Alarm and Monitoring Systems 53
4.3.1 Centralized Fire Detection and Alarm System 53
4.3.2 Vehicle Space Alarm and Monitoring System 53
4.3.3 Machinery Alarm and Monitoring System 53
4.4 Lifesaving Equipment 54
4.4.1 Lifeboat(s) and Davit(s) 54
4.4.2 Liferafts 54
4.4.3 Fast Rescue / Utility Boat(s) and Davit(s) 55
4.4.4 Marine Evacuation Slides 55
4.4.5 Means of Rescue (MOR) Platform and Davit 56

4.4.6 Other Lifesaving Equipment 56
Section 5 Electrical Equipment 57
5.1 Ship Service Power Generation 57
5.2 Ship Service Power Distribution 58
5.3 Emergency Power Generation 60
5.4 Emergency Power Distribution 60
Section 6 Machinery and Auxiliary Equipment 62
6.1 Main Propulsion 62
6.1.1 Main Engines 62
6.1.2 Main Engine and Propulsion Controls 63
6.1.3 Reduction Gears 63
6.1.4 Propellers and Shafting 64
6.2 Bow Thruster 65
6.3 Heating Plant 66
6.3.1 Oil-Fired Boiler 66
6.3.2 Waste Heat Boiler 67
6.3.3 Radiators and Steam and Condensate Piping 67
6.4 Steering System 68
6.5 Sewage and Wastewater Collection and Treatment 69
6.5.1 Sewage Collection and Sanitary Piping 69
6.5.2 Sewage Treatment and/or Discharge 69
6.6 Seawater Systems 71
6.6.1 Bilge and Ballast System 71
6.6.2 Flushing System 71
6.6.3 Seawater Cooling Systems 72
6.7 Freshwater Systems 73
6.7.1 Freshwater Cooling Systems 73
6.7.2 Potable Water 73
6.8 Fuel and Lube Oil 74
6.8.1 Fuel Oil System 74
6.8.2 Lube Oil System 75
6.9 Compressed Air 75
6.10 Ventilation 76
6.10.1 Vehicle Space Ventilation 76
6.10.2 Machinery Space Ventilation 76

6.10.3 Accommodation Space Ventilation 77
6.11 Refrigeration 78
6.11.1 Refrigerators 78
6.12 Elevator Systems 78
6.12.1 Passenger Elevator 78
6.12.2 Service Elevator and Dumbwaiter 79
Section 7 Deck Equipment 80
7.1 Anchor Windlass and Chain 80
7.2 Mooring Capstans and Chocks 80
7.3 Vehicle Loading Doors 81
7.4 Stern Door and Ramp 81
Section 8 Command, Control, Communications 83
8.1 Navigation Equipment 83
8.1.1 Steering Stand 83
8.1.2 Radar 83
8.1.3 Depth Sounder 83
8.1.4 Radio Equipment 83
8.1.5 Global Positioning System and Automatic Identification System 84
8.1.6 Gyrocompass 84
8.1.7 Weather System 84
8.1.8 Navigation Lights 85
8.1.9 Searchlights 85
8.1.10 Speed Log 85
8.1.11 Voyage Data Recorder (VDR) 85
8.1.12 Bridge Navigation Watch Alarm System (BNWAS) 85
8.1.13 Electronic Chart Display and Information System (ECDIS) 86
8.2 Communication Systems 86
8.2.1 Docking Intercom and Talkback Systems 86
8.2.2 Public Address and General Alarm System 86
8.2.3 Sound Powered Telephone and Engine Order Telegraph (EOT) 87
8.2.4 Satellite and Wireless Communications 87
8.2.5 Closed Circuit Television (CCTV) System 87
Appendix A Fleetwide Regulatory Review A-1
Appendix B PCCI October 2022 Coatings Survey Report B-1
Appendix C Menezil Engineering September 2022 Infrared Thermography Inspection Report C-1

Section 1 Introduction

1.1 Fleet Condition Survey Program

This report is a deliverable under the AMHS Fleet Condition Survey Program, Project No. SAMHS00272. The survey program's objectives are to summarize vessel condition at the time of survey, report construction or significant refurbishments performed since the previous Fleet Condition Survey, recommend and prioritize vessel maintenance actions, and incorporate all vessel SMRs for complete maintenance overview. The Fleet Condition Survey Program has been ongoing since the 1990s. Most recently, surveys took place in 2016-2017, 2020, and 2021-2022.

The Fleet Condition Survey reports incorporate information from ship surveys, recent studies, and discussions with AMHS engineering and shipboard personnel. While every effort has been made to verify the information used in developing this report, it has not been possible in every instance, and some factual errors may exist. For example, items reported as original equipment may have been replaced at some time during the vessel's history. The opinions of the crew present at the time of the survey or those that submitted comments on the draft report may differ from those of other crew members assigned to the vessel. The information in this report reflects the condition of the vessel at the time of survey, and subsequent repairs or improvements performed by a shipyard or by the crew may not be documented in this report.

1.2 Vessel Description

M/V Matanuska was built in Seattle, Washington, at the Puget Sound Bridge and Dry Dock. The keel was laid on July 6, 1962, the vessel was launched on December 5, 1962, and sea trials were completed in May 1963.

The vessel was lengthened and renovated in 1978 at the Willamette Iron and Steel Company shipyard in Portland, Oregon, and was repowered in 1984/1985 and 2018/2019. Matanuska is now 408 feet long, with capacity for 83 Alaska standard vehicles and a service speed of 16.5 knots.

The M/V Matanuska provides service from Bellingham, Washington, and Prince Rupert, British Columbia, to the communities of Southeast Alaska. The vessel bears a Certificate of Inspection (COI) for 499 passengers. The vessel also holds a Safety of Life at Sea (SOLAS) certificate. For passenger service, the ferry provides 5 four-berth cabins, 21 three-berth cabins, 80 two-berth cabins (including 1 two-berth ADA-accessible cabin), food services, several lounges, and a Solarium. Most of the staterooms are arranged in groups of four, with each group located on its own side ("dead-end") corridor.

1.2.1 Regulatory Information

Matanuska is a USCG Subchapter H passenger vessel and carries a USCG certificate that includes the following notations: Lakes, Bays, and Sounds. The vessel's gross tonnage is 3,029 tons.

Matanuska is maintained in ABS class under the notation ✠A1, Ⓒ, ✠AMS, Passenger Ferry Service, and all surveys are up to date. ABS regularly inspects the vessel's structure and machinery. Upcoming surveys include:

Table 1 ABS survey dates

Survey	Date
Annual Hull Survey 5	02-Feb-2024
Annual Machinery Survey 5	02-Feb-2024
Boiler Survey - Aft Vertical Exhaust Gas Boiler	02-Feb-2024
Boiler Survey - Auxiliary Water Tube Boiler F	02-Feb-2024
Boiler Survey - Fwd Vertical Exhaust Gas Boiler	02-Feb-2024
Special Continuous Survey - Machinery 12	02-Feb-2024
Special Periodical Survey - Hull 12	02-Feb-2024
Tailshaft Survey – Tailshaft (port and starboard)	16-Nov-2024

Matanuska currently holds a SOLAS certificate but does not meet new International Maritime Organization (IMO) MARPOL Annex VI energy efficiency requirements that entered into force in 2023, commonly referred to as EEXI (Energy Efficiency eXisting ship Index). This report recommends researching ways to reduce the Matanuska's EEXI score in order to remain in IMO compliance. Without additional engineering research, it is uncertain how challenging EEXI compliance will be. What is clear is that compliance with EEXI is mandatory. If AMHS is not willing or able to get the Matanuska to comply with the EEXI criteria, there is little point in continuing to perform SOLAS upgrades, as the vessel will no longer be able to serve international ports.

It is important to understand that the regulatory modifications being imposed by the USCG on the Matanuska as a result of the Major Conversion Determination from the 2018 repower are mainly SOLAS regulations. These modifications are estimated to cost about $40 million dollars. Given the anticipated remaining service life of the Matanuska and the uncertainty in meeting EEXI, AMHS needs to decide soon if it is cost effective to keep the Matanuska in compliance with IMO and SOLAS or allow the IMO/SOLAS certification to lapse. As Matanuska is one of only two AMHS vessels with IMO/SOLAS certification (Kennicott being the other vessel), should its IMO/SOLAS certification lapse, other plans would need to be made for serving Prince Rupert, BC, which is the only AMHS route requiring an IMO/SOLAS certificate.

It will be important to obtain USCG concurrence with any decisions made regarding future IMO/SOLAS certification on the Matanuska.

Appendix A contains a fleetwide regulatory overview.

1.2.1.1 Major Conversion Determination

The 2018 repower project on the Matanuska was ruled a major conversion (MCON) by USCG due to the project's ability to "substantially prolong the life of the vessel" (Title 46, United States Code 2101). USCG ruled that "when an alteration constitutes an MCON, it is appropriate to bring the entire vessel into compliance with the safety standards in effect at the time the work is completed, where it is both reasonable and practicable to do so" (MSC Major Conversion Determination Letter H2-1500252).

When evaluating required actions, USCG noted the following considerations:

- Risks faced by Matanuska's operations.
- History of marine casualties, passenger safety.
- Crew safety.
- Feasibility of obtaining funding in various timeframes.
- Statement of the Matanuska's planned service life as ending in 2027.

Most action items were corrected during the 2107/2018 and subsequent shipyard periods. Three items were given extensions and remain to be resolved as detailed in Table 2 below.

It is important to note that the ship was only found deficient in regard to SOLAS regulations necessary for sailing on international voyages (i.e., sailing to Prince Rupert, BC, Canada). No deficiencies were identified in the MCON process in regard to USCG regulations for domestic service.

There has been no formal clarification with USCG regarding the allowable service life of the vessel. This is a significant risk item for future operation of the Matanuska.

Table 2 MCON determination action items

ID	Item	Description	Ext.	Due	Status
SA070	Safety Center	A safety center shall either be a part of the navigation bridge or be located in a separate space adjacent to and having direct access to the navigation bridge, so that the management of emergencies can be performed without distracting watch officers from their navigational duties.	5 yr	2023	Ongoing. A design for the modification has been completed and approved by ABS & USCG. Construction not yet started.
SA069	Dead-End Corridors	In SOLAS, a corridor, lobby, or part of a corridor from which there is only one route of escape is prohibited (74 SOLAS Amended II - 2 / 13.3.1.2). MATANUSKA's passenger cabin layout contains many dead - end corridors. U.S. regulations allow dead - end corridors as long as they are less than 40' long. a) MATANUSKA must eliminate the passenger area dead - end corridors within five years of completing the 2017/2018 yard period. The modifications must meet current SOLAS requirements. b) Plans for the dead - end corridor elimination must be submitted to the Marine Safety Center within one year of the issuance of this letter. c) MATANUSKA must add electrically powered lights meeting the 74 SOLAS Amended II - 2/ 13.3.2.5.1 requirements which indicate the routes of escape prior to returning to commercial service after the 2017/2018 yard period . The lights must clearly show the various escape routes from passenger cabins and shall clearly mark the dead – end corridors as being non - escape routes. d) The passenger room smoke detection updates described in	5 yr	2023	Ongoing. A design for the modification has been completed and approved by ABS & USCG. Construction not yet started.

ID	Item	Description	Ext.	Due	Status
		Amended DET 02 must be implemented. e) The passenger room lighting updates described in ELM 01 must be implemented.			
SFP001	Upgrade Structural Fire Protection	A USCG plan review letter (H2-1800638) highlighted the deficiencies in the existing structural fire protection (SFP) of the MATANUSKA when compared to the most recent SOLAS regulations. All remaining A - class bulkheads and decks throughout the vessel should be upgraded to A-30 and A-60 insulation within five years of completing the 2017/2018 yard period (Proposal Phases 2 & 3). The SFP related to the dead - end corridor cabin overhaul that will occur within five years must meet current SOLAS standards when completed (S&A 069).	5 yr	2023	Ongoing. Remaining work is primarily on the Cabin Deck.

1.3 Vessel Condition

Matanuska was surveyed December 8–9, 2022, while the vessel was drydocked in Ketchikan, AK. The information in this report reflects the condition of the vessel at that time. Subsequent repairs or improvements performed by a shipyard or by the crew may not be documented in this report.

1.3.1 Reporting Methodology

Survey data is collated into standardized, identically named categories and information hierarchies for all vessels surveyed. These standardized categories make up the heading nomenclature and hierarchy seen in Sections 3–9.

Some categories are not relevant to some vessels; for example, Aurora and Lituya do not have a vehicle elevator system, whereas Kennicott and Tustumena do. In such cases, the system's heading is simply omitted from the survey report. However, all headings and heading hierarchies in Sections 3–9 are generated from the same uniform template.

Using a consistent information breakdown system across all surveys and survey reports facilitates the evaluation and comparison of maintenance need, cost, and priority across various systems, areas of structure, and types of spaces fleetwide. Fleetwide findings are provided separately in the Fleet Condition Survey Executive Summary Report.

Within each system, space, or structure heading for which survey information exists, information is further broken down into four sequential categories:

System / Space / Structure > Description > Prior Work > Condition > Recommendations

The Description lists an item's make, model, or function; Prior Work provides a noncomprehensive background of relevant work that has taken place on the item; Condition provides the maintenance status of the item at the time of survey; and Recommendations lists work recommended for the item based on conditions found during the survey.

1.3.2 Recommendations

The Fleet Condition Survey scope includes making vessel maintenance recommendations, prioritizing them, and estimating the cost to carry them out. Recommendations presented in this report are determined based on interviews with crew, visual survey of the vessel, review of inspection reports such as coatings and infrared thermographic survey reports, and review of the Ship Maintenance Request (SMR) database.

All open SMRs are included as recommendations, except for those that the crew indicated were being addressed during shipyard work in progress during the survey. Within each Recommendations subsection in which they appear, SMRs are denoted with asterisks; for example:

Clean and recoat the Steering Gear Room bilge.

Vessel maintenance recommendations are provided throughout the various subsections of this report from Section 2 onward. The full list of recommendations made in this report, along with their estimated costs and assigned priority levels, is provided in Table 3.

The previous Fleet Condition Survey reports recommended performing all modifications necessary to maintain the Matanuska in compliance with IMO/SOLAS. With the new IMO MARPOL Annex VI efficiency requirements (EEXI) that Matanuska does not meet, and given the age of the vessel, AMHS needs to decide whether or not to maintain the Matanuska's IMO/SOLAS certification. Addressing the ability of the Matanuska to comply with EEXI is of utmost importance and urgency. If complying with EEXI is not feasible, continuing to spend money on modifications to maintain SOLAS certification is not recommended.

Table 3 2023 Matanuska recommendations, costs, and priority levels

Section	Recommendations	Priority	Item Cost
Main Engines	Research ways to reduce the Matanuska's EEXI score in order to remain in IMO compliance.	1	$100,000
Passenger Staterooms	Refurbish the entire Cabin Deck stateroom area to remove dead-end corridors and install new staterooms and T&S modules per the AMHS Fleetwide Amenities Upgrades plans and USCG requirements to maintain SOLAS compliance.	1	$31,000,000
Structural Fire Protection	Complete Phase 2 and Phase 3 additional main vertical zone insulation upgrades to meet applicable SOLAS regulations.	1	$1,500,000
Officer Staterooms	Convert the First Engineer stateroom into a SOLAS-compliant Safety Center per USCG's MCON ruling.	1	$970,000
Automatic Sprinkler System and Piping	Replace the accommodation sprinkler system pressure tanks.	1	$290,000
Means of Rescue (MOR) Platform and Davit	*Install an electric retrieval winch in the port MES slide box to facilitate raising and lowering disabled passengers.*	1	$290,000
Fan Rooms	*Repair holes in the deck of Fan Room #7 to restore the Engine Room Fidley fire boundary and prevent water ingress.*	1	$200,000
Ship Service Power Distribution	*Configure the generator controls or automation system to trip under voltage-tripped breakers on	1	$130,000

Section	Recommendations	Priority	Item Cost
	the main switchboard in the event a generator goes above a set load value.*		
MOR Platform and Davit	Reinstall the MOR platform in a more effective location.	1	$100,000
Pilothouse and Wing Stations	Move the GMDSS and any other equipment that does not need to be in the Pilothouse into the Safety Center to free up bulkhead space.	1	$72,000
Ship Service Power Distribution	*Connect switchboard control power to the redundant 24VDC that the generator engines use as control power.*	1	$66,000
Lifeboat(s) and Davit(s)	*Complete the list of required SOLAS lifeboat maintenance items.*	1	$55,000
Crew Staterooms	Separate women's and men's heads in the Gallery Deck crew staterooms.	2	$2,900,000
Closed Circuit Television (CCTV) System	Investigate feasibility of upgrading the CCTV system and extending monitoring to more locations, including but not limited to normally uncrewed spaces, passenger spaces, and outside of the stack.	2	$1,600,000
Officer Staterooms	Replace toilets in the Chief Mate's, Second Mate's, Third Mate's, and Second Engineer's Staterooms with deck-mounted flanged units to facilitate better leak detection and repair.	2	$360,000
Fan Rooms	Blast and repair steel as necessary, apply new coatings to deck, bulkheads, and ductwork, and repair corroded cable glands in Fan Room #5 plenum.	2	$340,000
Oil-Fired Boiler	Upgrade the boiler fuel pumps.	2	$300,000
Superstructure	*UT and make a steel insert repair at the unused foundation and penetration location on the Housetop, insulating to A60 as required; abate ACM, lead paint, and coal tar in way of the work.*	2	$210,000
Officer Staterooms	*Replace Officer Stateroom carpets.*	2	$120,000
Public Passageways, Foyers, and Lobbies	Boat Deck Forward and Midship Foyers: Address corrosion around radiator piping deck penetrations.	2	$79,000
Ship Service Power Distribution	Investigate the loud/buzzing transformer under the forward Gallery Deck stairtower.	2	$70,000
Ship Service Power Distribution	Conduct a power systems study to determine the cause of the power fluctuations.	2	$70,000
Sewage Collection and Sanitary Piping	Replace remaining steel piping in-kind on an as-needed basis.	2	$51,000
Ship Service Power Distribution	Address overheating of port main engine distribution panel Breaker P-460.	2	$46,000
Ship Service Power Distribution	Address overheating of two Fidley Compressor Unit #2 fuses.	2	$43,000

Section	Recommendations	Priority	Item Cost
Fan Rooms	Replace damaged/worn out lagging on ductwork and piping.	2	$39,000
Reduction Gears	Coordinate with Rolls-Royce to troubleshoot the pressure relief valve actuation issue at low loads.	2	$35,000
Ship Service Power Distribution	Address overheating of Car Deck lighting panel MVZ-2 wire terminals.	2	$24,000
Ship Service Power Distribution	Address overheating of the #3 MSD control panel's bottom wire terminal (6T3).	2	$24,000
Ship Service Power Distribution	Address overheating of #2 MSD control panel Contactor Cell #2 wire terminals.	2	$24,000
Ship Service Power Distribution	Address overheating of #1 MSD control panel Contactor Cell #1 wire terminals.	2	$24,000
Accommodation Space Ventilation	Perform the accommodations HVAC system upgrades planned as part of the upcoming Cabin Deck refurbishment.	3	$1,300,000
Topsides	Blast, inspect, and recoat ventilation louvers and other hull openings on the side of the ship, replacing those that have thinned excessively due to corrosion.	3	$500,000
Tanks, Voids, and Bilges	*Repair the double bottom tank top in the Bow Thruster Room; abate possible lead paint as required.*	3	$490,000
Vehicle Space	Blast and recoat the Vehicle Space deck.	3	$490,000
Crew Staterooms	Address corrosion in the Second Deck Heads.	3	$460,000
Crew Staterooms	Renew deck coverings and repaint bulkheads in the passageways in way of the Gallery Deck crew staterooms.	3	$410,000
Superstructure	All of the superstructure windows that have yet to be replaced or repaired should be inspected and replaced to ensure there is no wastage inside the bulkheads.	3	$300,000
Accommodation Space Ventilation	*Install split HVAC units in the Vehicle Deck overhead to cool the Purser's Offices, Steward's Office, Information Counter, and UPS space.*	3	$280,000
Tanks, Voids, and Bilges	Power tool clean and recoat corrosion areas on the skin plate of the No. 11 Port & Starboard Wing Voids.	3	$250,000
Officer Staterooms	*Replace Officer Stateroom windows as needed, repairing surrounding steel where necessary.*	3	$190,000
Accommodation Space Ventilation	*Install an AC compressor for the Gallery Deck crew staterooms.*	3	$190,000
Tanks, Voids, and Bilges	Power tool clean and recoat the lower sections of the No. 10 Port and Starboard Wing Voids, as well as the cross flood between them.	3	$170,000
Public Heads	Bridge Deck Aft Women's and Men's toilets and showers: clean and repair rust on fixtures and on decks, as needed.	3	$160,000

Section	Recommendations	Priority	Item Cost
Public Heads	Boat Deck forward Women's Head: Repair corrosion on deck, fixtures, and piping, replace lighting diffusers and overhead.	3	$160,000
Tanks, Voids, and Bilges	Power tool clean and recoat the middle section of the No. 10 Centerline Void.	3	$130,000
Crew Staterooms	Replace outdated furniture in both sets of staterooms.	3	$120,000
Crew Staterooms	Repaint bulkheads in both sets of staterooms as necessary.	3	$120,000
Accommodation Space Ventilation	*Install an AC compressor and air-cooled condenser for the Officer Staterooms.*	3	$93,000
Tanks, Voids, and Bilges	Power tool clean and recoat the deck of the No. 4 Cofferdam.	3	$82,000
Public Heads	Bridge Deck forward Women's Head: Repair corroded bulkheads behind toilets, replace overhead.	3	$82,000
Vehicle Space	Replace sounding tube caps as necessary, up to and including replacing the threaded insert into the deck if needed. Consider installing caps raised several inches above the deck to prevent water intrusion.	3	$71,000
Tanks, Voids, and Bilges	Power tool clean and recoat the No. 4 Void above the Starboard Wing Tank.	3	$67,000
Vehicle Space	Take UT readings in the Vehicle Space in way of the center island and port forward car door and recoat the deck.	3	$67,000
Public Heads	Bridge Deck forward Men's Head: Repair corrosion around toilets.	3	$63,000
Vehicle Space	*Replace damaged insulation on the center island bulkhead.*	3	$52,000
Fuel Oil System	Modify the lube oil purifier to operate as a fuel oil purifier.	3	$46,000
Mooring Capstans and Chocks	Renew worn coatings on the capstans.	3	$40,000
Lockers and Dry Stores	Recoat decks in Bosun's Stores, Boat Deck Bar Stores, Engineer's Stores Locker, and Garbage Compactor and Cart Storage.	3	$33,000
Emergency Generator Room	Renew deck coatings in the Emergency Generator Room.	3	$32,000
Solarium	Repair the cracks in the Solarium deck covering.	3	$15,000
Automatic Sprinkler System and Piping	Recoat and/or replace the damaged section of sprinkler piping in the Solarium overhead.	3	$10,000
Emergency Power Generation	*Repair the emergency generator radiator air diffuser mount.*	3	$8,100
Ship Service Power Generation	Replace generator sets during a future CIP.	4	$5,000,000

Section	Recommendations	Priority	Item Cost
Passenger Staterooms	Provide for more than one ADA-compliant stateroom for passengers during the refurbishment; this is incorporated into the current project plan.	4	$3,500,000
Galley	Replace the deck covering in the Galley.	4	$3,500,000
Ship Service Power Distribution	Megger and replace remaining legacy cabling, including lighting cabling.	4	$1,400,000
Oil-Fired Boiler	Upgrade the boiler burners and controls.	4	$1,200,000
Passenger Staterooms	*Replace carpet throughout the staterooms per a specific request in a current SMR; this is incorporated into the current plan.*	4	$710,000
Ship Service Power Distribution	Replace the legacy transformers along with the generators in a future CIP.	4	$560,000
Passenger Lounges and Dining Areas	Cafeteria: improve lighting and replace diffusers, dampen noise from the HVAC fans.	4	$260,000
Officer Staterooms	Replace outdated furniture.	4	$190,000
Compressed Air	Address corrosion on the air receivers.	4	$140,000
Passenger Lounges and Dining Areas	Toddler Play Area: replace carpeting and lighting, recoat bulkheads.	4	$130,000
Public Passageways, Foyers, and Lobbies	Boat Deck: Replace carpeting throughout passageways, foyers, and entryways.	4	$110,000
Public Heads	Boat Deck forward Men's Head: Replace overhead, repour PRC deck covering.	4	$110,000
Passenger Lounges and Dining Areas	Forward Observation Lounge: replace dated lighting diffusers, reupholster torn furniture.	4	$100,000
Ship Service Power Distribution	Replace the remaining two original motor controllers for ventilation fans 01 and 03 located in Fan Room 5 and serving the Cabin Deck.	4	$100,000
Radiators and Steam and Condensate Piping	Include refurbishing the steam heaters in any major habitability improvements.	4	$100,000
Offices	Replace the overhead, lighting, and deck covering in the Chief Steward's Office.	4	$92,000
Galley	Increase the lighting level in the bussing and scullery area.	4	$71,000
Passenger Lounges and Dining Areas	Bridge Deck Recliner Lounge: reupholster recliners as needed and replace the broken window blind.	4	$65,000
Passenger Elevator	Troubleshoot and if necessary replace the passenger elevator intercom.	4	$46,000
Service Elevator and Dumbwaiter	Troubleshoot and if necessary replace the service elevator intercom.	4	$46,000
Public Passageways, Foyers, and Lobbies	Boat Deck Forward Foyer: Replace overhead and lighting, address corrosion around radiator piping deck penetrations.	4	$43,000
Public Passageways, Foyers, and Lobbies	Boat Deck: Replace deck coverings and lighting in stairways.	4	$43,000

Section	Recommendations	Priority	Item Cost
Crew Messes and Lounges	Improve access into the Gallery Deck Exercise Area.	4	$36,000
Public Passageways, Foyers, and Lobbies	Bridge Deck Forward Foyer: Improve lighting levels, replace old overhead tiles.	4	$35,000
Public Passageways, Foyers, and Lobbies	Bridge Deck Midship Stairwell: Improve lighting, repair worn deck covering, repair bulkheads, replace overhead.	4	$35,000
Firemain System	Replace Fire Pump No. 3 with make and model consistent with the other two fire pumps.	4	$35,000
Public Passageways, Foyers, and Lobbies	Boat Deck Forward Passageway: Replace overhead and lighting.	4	$22,000
Satellite and Wireless Communications	Add off-ship connectivity in the First Aid Room and Purser's Office to improve service for sick passengers and improve reservation capability.	5	$1,400,000
Offices	Provide additional areas for crew to do training and print materials.	5	$370,000
Public Address and General Alarm System	Upgrade to a modern public address system.	5	$360,000
Officer Staterooms	When the Safety Center is added to the Bridge Deck, configure it to accommodate a shared office/conference room for mixed gender discussions.	5	$220,000
Officer Staterooms	Repurpose the crew head in the First Engineer stateroom to be a dedicated head for the bridge once the space is converted to a Safety Center.	5	$170,000
Radiators and Steam and Condensate Piping	Consider electric controls when replacing/refurbishing steam valves.	5	$160,000
Mooring Capstans and Chocks	Consider installing a second aft capstan on the Cabin Deck.	5	$160,000
Ship Service Power Distribution	Add more power outlets in public spaces during the next major refurbishment.	5	$140,000
First Aid Room	Ensure that the space allotment and arrangement of the renewed First Aid Room are more conducive to attending to passengers.	5	$120,000
Engineer’s Operating Station (EOS)	Perform a noise study and develop a noise mitigation strategy for noise levels in the EOS. At minimum, wrap all ducting and piping with insulation and insulate the deck.	5	$58,000
Lockers and Dry Stores	Improve locker lighting throughout the vessel.	5	$52,000
Crew Staterooms	Install privacy curtains around the bunks on the Second Deck.	5	$41,000
Machinery Alarm and Monitoring System	Investigate enabling remote third party access to the IMACS system for troubleshooting and system updates, but consider the cybersecurity implications before implementing.	5	$35,000

Section	Recommendations	Priority	Item Cost
Emergency Power Distribution	Provide for remote monitoring of the emergency diesel generator, potentially using the CCTV system.	5	$29,000

1.4 Cost Summary

Table 4 provides total estimated costs to complete the recommendations provided in this report. These estimates include all priority levels (1-5) and are broken down by funding source (State versus CIP). For the purposes of this analysis, it was assumed that projects with costs lower than $1,000,000 were State funded projects.

Table 4 2023 Fleet Condition Survey recommendation costs

Construction & Equipment Cost (ROM)	Engineering Cost (ROM)	Total Project Cost (ROM)	
$13,326,000	$981,000	$14,307,000	State Funded Project Subtotal
		$3,572,000	AMHS Admin and Construction Support[1]
		$715,000	Consultant Support[2]
		$18,599,000	State Total
$53,549,000	$751,000	$54,300,000	Capital Improvement Project Subtotal
		$13,575,000	AMHS Admin and Construction Support[1]
		$2,715,000	Consultant Support[2]
		$70,590,000	CIP Total

1. Calculated at 25% of ROM cost
2. Calculated at 5% of ROM cost

1.5 Completed Recommendations and SMRs

Table 5 lists recommendations from the previous Fleet Condition Survey report that the survey team or crew noted as complete during the current survey. This list includes completed SMRs, which are marked with asterisks.

Table 5 Recommendations and SMRs completed since 2022 Fleet Condition Survey

Section	Recommendations	Priority
Fan Rooms	Repair the leaking steam reheater in the Bridge Deck Fan Room.	2
Fan Rooms	*Remove wires, replace kicktubes, repair the deck, and renew wiring as required for kicktubes in Fan Room #6.*	2
Ship Service Power Distribution	Address overheating on the SW circulation pump on the port main engine (L3 wire terminal, top and bottom of the starter).	2
Ship Service Power Distribution	Address overheating on the top of the port main engine breaker.	2
Ship Service Power Distribution	Address overheating of the fuse in Compressor Unit #1 in the Fidley.	2
Ship Service Power Distribution	Address overheating of Breakers #5 and #7 in the Fidley.	2
Ship Service Power Distribution	Address overheating on the top of the starter screws on MCC #8 in the Fidley.	2

Ship Service Power Distribution	Address overheating of the #3 MSD control panel in the MSD Room (top and bottom book cell contactor).	2
Ship Service Power Distribution	Address overheating of the #2 MSD control panel (top and bottom book cell contactor).	2
Seawater Cooling Systems	*Replace reduction gear / controlled-pitch propeller (CPP) cooler discharge ball valves with globe valves.*	2
Steering Stand	*Replace the current rudder order indicator with a larger unit.*	2
Tanks, Voids, and Bilges	Power tool clean and recoat the MSD Room bilge.	3
Crew Heads	Repair the corrosion on the Engineer's Head deck.	3
Waste Heat Boiler	Ensure that the 2021 piping work addresses the safety valve issue.	3
Gyrocompass	Move the gyrocompass unit out of the bridge and relay information from it using a repeater.	3
Sewage Treatment and/or Discharge	Investigate adding a suction line on the starboard side of the V2 tank.	5

This is only a partial register of work completed on the vessel during the interim between the two surveys. FCS scope does not include identifying and tracking routine maintenance or work needed to keep the ship in compliance with Class or insurance requirements. Further, additional steel replacement and machinery maintenance beyond that recommended in Fleet Condition Surveys typically takes place in any given shipyard period.

Prior Work

Many of the small, localized coating failures described below could be dealt with by the ship's crew between overhauls and CIPs to reduce corrosion, wastage, and general vessel deterioration. For large areas and areas requiring personnel lifts, scaffolding, sandblasting, etc. it would be appropriate to wait until shipyard periods.

A significant amount of steel was replaced during the 2018/2019 repower. Some of this was planned, but a large amount of deteriorated steel requiring replacement was also discovered during the repower. The repower project included UT gauging of the tank tops, with repairs completed as needed. The list below summarizes the 2018/2019 repower change orders related to steel repairs.

1. Main Engine Room tank top and engine foundations.

2. Three inserts in marine sanitation device (MSD) space.

3. Four additional inserts in the Main Engine Room.

4. One insert in the Shaft Alley.

5. No. 1 Deep ballast tank.

6. Tank top plating near frames 17-19 portside, two 1-ft2 areas.

7. No. 9 centerline ballast tank, bottom shell plating.

8. Jacket water holding tank, bottom shell plating.

9. Bow Thruster Compartment, side shell plating.

10. Bosun Stores deck plating.

11. Stringer renewal aft of Bulkhead 12.

12. V1 and V2 sewage tank top repairs.

13. Repairs to damaged vertical stiffeners in the Fidley.

14. Boat Deck Port Women's Head bulkhead insert.

15. Renew steel in Captain's Head and Third Mate's Head.

16. Base Main Deck Stairs from Deck 5 to the Car Deck, near Fr 85.

17. Zone 1, 2 and 3 repairs included many miscellaneous areas throughout the vessel (handrails, kickpipes etc.).

The hull was blasted and painted from the keel to the boottop during the repower.

Tank and deck recoating occurred during the 2021 shipyard period, including the MSD tanks, Galley Head, Officer's Mess deck, and the Pilothouse deck. Steel replacements were completed in the following areas: V1 (minor), V2 (minor), V3 (significant) sewage tanks; 9C ballast tank, frames 145-147; #9 Double Bottom, frames 144-145.

During the 2022 winter maintenance period, a significant structural crack in the forward Vehicle Space at the Mezzanine Level was discovered and repaired. The crack is likely due to fatigue over the vessel's long service life and is not expected to cause future problems. A heavily wasted section of steel in way of the Pilothouse door was also cropped and replaced.

2.1 Underwater Hull

Description

Seachests and sea valves are annually inspected, cleaned, and maintained and are in good condition, as are their anodes. Chlorinators have been installed in all seachests, except the Shaft Alley and MSD Room (sprinkler pump) seachests.

The cathodic protection system is regularly inspected and maintained. Cathode and anode inspection are scheduled as part of the state overhaul during the repower project.

Condition

Coatings were in good condition overall, with some spot coating taking place while the vessel was drydocked. Mild coating damage was seen in high-flow areas such as on propeller struts and rudders.

There were no reported problems with the seachests.

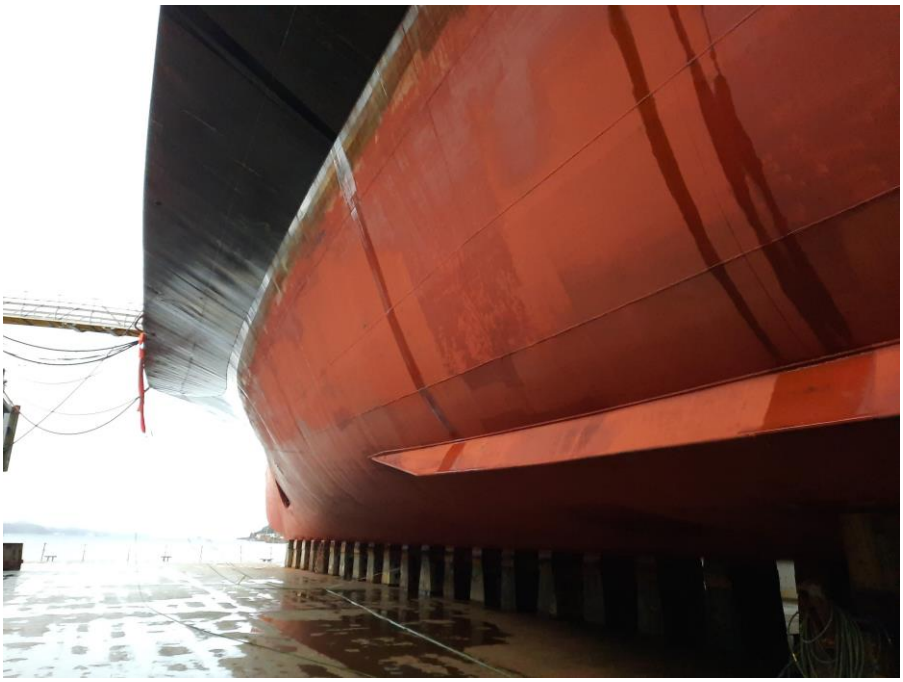


Figure 1 Underwater hull coatings, port side

Figure 2 Propeller struts and rudders, as seen from port side

Figure 3 Bow thruster tunnel

2.2 Tanks, Voids, and Bilges

Prior Work

The 2018/2019 repower project included a full tank top inspection and renewal for the vessel. There were three inserts in the MSD space, four inserts in the Main Machinery Room, and one insert in the Shaft Alley.

Steel replacements were completed more recently in the following areas: V1 (minor), V2 (minor), V3 (significant) sewage tanks; 9C ballast tank, frames 145-147; #9 Double Bottom, frames 144-145.

New steel work was evident in the MSD Room bilge during the 2023 survey.

Condition

The Chief Engineer stated that a substantial amount of double bottom steel work is needed; this is a high priority.

PCCI surveyed coatings in Matanuska's tanks, voids, bilges, and other areas of the vessel in October 2022. They recommended addressing coatings in the following spaces in the near future: No. 11 Port & Starboard Voids, No. 4 Void, No. 10 Port & Starboard Voids, and No. 10 Centerline Void. PCCI also noted that the No. 4 Cofferdam was closed at the time of the coatings survey, so its condition could not be verified. However, addressing coatings in this space was among PCCI's 2021 recommendations, and it is likely that this work is still outstanding. A copy of PCCI's October 2022 survey report is provided in Appendix B.

Recommendations

- Power tool clean and recoat the deck of the No. 4 Cofferdam.
- Power tool clean and recoat the No. 4 Void above the Starboard Wing Tank.
- Power tool clean and recoat the middle section of the No. 10 Centerline Void.
- Power tool clean and recoat the lower sections of the No. 10 Port and Starboard Wing Voids, as well as the cross flood between them.
- Power tool clean and recoat corrosion areas on the skin plate of the No. 11 Port & Starboard Wing Voids.
- *Repair the double bottom tank top in the Bow Thruster Room; abate possible lead paint as required.*

2.3 Topsides

Condition

The curtain plate between the Main and Cabin Decks has many minor dents and dings from docks and other sources. These are not of structural concern but do degrade the appearance of the vessel.

Ventilation louvers, particularly intakes, are in poor condition and continue to be a maintenance concern for the crew, particularly with regard to risk of corrosion spreading into the adjacent fire dampers and affecting their operation. It was noted that the fire dampers are not stainless, so they are vulnerable to corrosion.

Figure 4 Corroded louvers on port side

Figure 5 Corroded louvers

Figure 6 Aft port side of vessel in drydock

Recommendations

- Blast, inspect, and recoat ventilation louvers and other hull openings on the side of the ship, replacing those that have thinned excessively due to corrosion.

2.4 Superstructure

Description

The superstructure is mostly steel, with some aluminum used in the construction of the Solarium, the stack, and the deckhouse in way of the vessel lengthening above the Sun Deck level.

Prior Work

The vessel's superstructure was sandblasted and recoated during the 2018/2019 repower. During the 2022 winter maintenance period, a significant structural crack in the forward Vehicle Space at the Mezzanine Level was discovered and repaired. The crack is likely due to fatigue over the vessel's long service life and is not expected to cause future problems. A heavily wasted section of steel in way of the Pilothouse door was also cropped and replaced.

Condition

The superstructure's condition has changed little since the 2021 survey. Coatings are in fair to good condition following recoating of the superstructure during the repower. The shipyard penetrated the steel superstructure while sandblasting during the repower, indicating that there are areas of significant deterioration. This is especially true near the door entrances and areas surrounding windows. Rust has begun to bleed down over the coatings in numerous areas of the superstructure, indicating corrosion issues beneath. Coatings should be maintained in good condition to avoid further structural deterioration.

The Sun Deck, Boat Deck and Cabin Deck outer decks also have areas of significant pitting throughout, now protected by the renewed non-skid coating. Some areas of the deck have deformation in the steel, which could be a tripping hazard for passengers. Coatings should be monitored to avoid more costly steel repairs.

An unused mount and deck penetration are present on the Housetop at around Frame 50. This area was epoxied to prevent leaks into Officers Quarters below, but a permanent repair to the steel is required. There may be ACM, lead paint, and coal tar in way of this work. An SMR is open for this item.

Some areas on the deck have tested positive for lead. The crew cannot complete routine coating repairs in these areas due to the health hazard, and the work must be done by a shipyard with appropriate hazmat precautions taken. Where lead traces are discovered in the coating systems, efforts should be made to remove it completely, as doing so will allow the crew to perform regular maintenance.

Figure 7 Rust bleeds on superstructure

Figure 8 Dishing on aft Boat Deck

Recommendations

- *UT and make a steel insert repair at the unused foundation and penetration location on the Housetop, insulating to A60 as required; abate ACM, lead paint, and coal tar in way of the work.*
- All of the superstructure windows that have yet to be replaced or repaired should be inspected and replaced to ensure there is no wastage inside the bulkheads.

Section 3 Spaces

3.1 Vehicle Space

Prior Work

During the 2018/2019 repower, three doubler plates were installed on the island (centerline casing) near the entrance to the aft crew quarters. The doubler plates covered small holes in the steel bulkheads that were above downflooding points.

Condition

The Vehicle Space structure is generally in fair condition. There are localized areas of moderate pitting in the Main Deck itself, particularly in way of stern ramp and vehicle side door openings and near the curtain plate. Damage is also evident along the centerline casing where water does not drain well. Plate dishing is primarily present in way of the amidships area, port and starboard.

Deck coatings are very worn. Problem spots are typically at pipe penetrations, cable penetrations, and angles where water has been sitting. However, there is also notable coating failure along vehicle lanes and on deck buttons (tiedown sockets).

Numerous sounding tubes located throughout the Vehicle Space have screw-in caps that are starting to corrode and have stripped out threads. These warrant replacement in the near future. The existing caps are flush with the deck, but they should be replaced with caps modified to protrude a few inches so that they are protected from water, similar to the sounding tube caps on Kennicott.

The bulkheads of the Vehicle Space are generally in good condition. Localized cosmetic plate dents and dings discussed in the hull section are evident, but typically do not impair the structural integrity of the deckhouse. One exception to this is captured in an open SMR, which notes that there is a 24"×44" dent from a vehicle on the centerline casing with the surrounding sheet steel sheathing riveted to the frames after separating from them. It appeared that only the insulation on the Vehicle Space side of the bulkhead was damaged.

Figure 9 Worn sounding tube caps

Figure 10 Dented insulation on center island

Figure 11 Worn Vehicle Space deck coatings

Recommendations

- Take UT readings in the Vehicle Space in way of the center island and port forward car door and recoat the deck.
- Blast and recoat the Vehicle Space deck.
- Replace sounding tube caps as necessary, up to and including replacing the threaded insert into the deck if needed. Consider installing caps raised several inches above the deck to prevent water intrusion.
- *Replace damaged insulation on the center island bulkhead.*

3.2 Passenger Habitable Spaces

Description

The hotel and public spaces are a collection of large viewing lounges, passenger cabins, restrooms, and a cafeteria.

Prior Work

The last major refurbishment was in 1978. Some high traffic areas had carpet replacements in January 2015.

3.2.1 Passenger Staterooms

Prior Work

Passenger staterooms received some spot coating on doors and bulkheads during the 2021 shipyard period.

Condition

To maintain SOLAS compliance, the entirety of Matanuska's Cabin Deck must be redone in the near future due to the USCG's MCON ruling requiring removal of dead-end corridors. Plans,

specifications, and estimates for doing so have been developed, and a wholesale refurbishment of the space is planned. All outfitting will be removed, which will require asbestos abatement due to ACM in the deck covering underlayment. Steel work and outfitting will be carried out as necessary to facilitate installation of new staterooms and T&S modules in a layout that eliminates dead-end corridors.

As a result, as during the 2021 survey, survey of the Cabin Deck staterooms was kept relatively brief. In the representative staterooms sampled, furniture condition varied from good to poor. Deck coverings and bulkheads were in fair condition, with some wear but nothing requiring refurbishment prior to the planned Cabin Deck replacement project. T&S modules showed some rust around fixtures, indicating that wastage will likely be discovered as modules are removed during the Cabin Deck replacement.

Recommendations in accordance with the planned Cabin Deck replacement project are provided below.

Recommendations

- Refurbish the entire Cabin Deck stateroom area to remove dead-end corridors and install new staterooms and T&S modules per the AMHS Fleetwide Amenities Upgrades plans and USCG requirements to maintain SOLAS compliance.
- Provide for more than one ADA-compliant stateroom for passengers during the refurbishment; this is incorporated into the current project plan.
- *Replace carpet throughout the staterooms per a specific request in a current SMR; this is incorporated into the current plan.*

3.2.2 Passenger Lounges and Dining Areas

Description

These spaces include the following.

Boat Deck: Forward Observation Lounge, Cocktail Lounge, Cafeteria, Toddler Play Area.

Bridge Deck: Recliner Lounge.

Prior Work

The Bridge Deck Recliner Lounge has not been fully refurbished since 1978. Since then, some piecemeal work in this space has occurred. The Cocktail Lounge overhead, lighting, and deck covering were recently renewed.

Condition

On the Boat Deck, the Forward Observation Lounge is in fair condition. Furniture is aged and in some places upholstery is torn. Lighting is poor and the fixtures are worn. The windows show minor areas of corrosion; no leaks were observed but the sill at the second window aft of the port side exit showed evidence of a past leak. The port side exterior door shows corrosion at its base.

The vessel crew has previously commented that should the Forward Observation Lounge be refurbished in the future, it should be rearranged. The tables and swivel chairs should be placed in the center of the room, with outward seating near the windows. The swivel chairs are popular, but passengers who use them do not tend to take advantage of the view, whereas passengers on the interior (without the tables) are trying to look out the windows.

The Toddler Play Area is in fair condition; the furniture, carpet, and bulkheads are aging and lighting is poor.

The Cocktail Lounge is in fair condition. The overhead and HVAC fixtures are dirty. The furniture was covered and the space was being used for storage at the time of the survey. Exterior windows show corrosion along their bottom edges. In the bar area, lighting is low, and the plumbing shows some corrosion. The bar area deck covering is in good condition.

The Cafeteria is in good condition, although lighting in the space is somewhat dim. A diffuser over the beverage counter is cracked. The deck covering is aged but in good condition. HVAC in the space is overly noisy.

The Bridge Deck Recliner Lounge is in fair condition. The overhead ceiling panels are in fair condition, with only a few panels dented. Many recliners need reupholstering. Paint cracking in the bottom corners of windows, reported in the 2021 survey, appears to have been addressed. Moisture and corrosion were noted at the base of some window frames. One window blind is broken.

Figure 12 Port passageway and Cocktail Lounge

Figure 13 Cafeteria

Recommendations

- Forward Observation Lounge: replace dated lighting diffusers, reupholster torn furniture.
- Toddler Play Area: replace carpeting and lighting, recoat bulkheads.
- Cafeteria: improve lighting and replace diffusers, dampen noise from the HVAC fans.
- Bridge Deck Recliner Lounge: reupholster recliners as needed and replace the broken window blind.

3.2.3 Public Passageways, Foyers, and Lobbies

Description

These spaces include, but are not limited to:

Bridge Deck: Forward Foyer, Midship Stairwell.

Boat Deck: Forward Foyer, Forward Passageway.

Cabin Deck: Main Foyer.

Prior Work

Around 2015, two exits were added on the forward outboard corners of the Forward Observation Lounge (one each port and starboard) that each include of a door marked with exit sign and new set of stairs leading to the exterior Boat Deck level.

The Cabin Deck Main Foyer was refurnished around 2021.

At the time of the survey, work was being done to replace the deck covering in the Boat Deck Forward Foyer.

Condition

The Boat Deck Forward and Midship Foyers are in fair condition. Overheads, lighting, and bulkheads are worn and in some cases mismatched but in fair condition. There is evidence of

corrosion at the deck penetrations of some radiators. The Boat Deck passageway overheads and lighting are in fair condition. Most of the deck coverings were covered at the time of the survey, but the carpeting in the public passageway on the Boat Deck leading to the Cafeteria appears worn. Corrosion is apparent along the bottom edges of windows. Stairways leading to the Boat Deck are in good condition.

Lighting is poor in the Bridge Deck Forward Foyer, with dirty and/or yellowing diffusers. Overhead tiles are old and dirty. The Bridge Deck Midship Stairwell is in poor condition, including poor lighting, deck covering, bulkheads, and overhead.

The Cabin Deck Main Foyer is still in good condition following its recent refurbishment, although the overhead and lighting were not part of this renewal and are aged. Passageways throughout the Cabin Deck are in fair to poor condition. These areas of the Cabin Deck will be renewed as part of the Cabin Deck refurbishment required under USCG's MCON ruling.

Figure 14 Corrosion around radiator deck penetration in aft Boat Deck Foyer

Figure 15 Corrosion on bottom edge of window in Boat Deck passageway

Recommendations

- Bridge Deck Forward Foyer: Improve lighting levels, replace old overhead tiles.
- Bridge Deck Midship Stairwell: Improve lighting, repair worn deck covering, repair bulkheads, replace overhead.
- Boat Deck Forward Foyer: Replace overhead and lighting, address corrosion around radiator piping deck penetrations.
- Boat Deck Forward and Midship Foyers: Address corrosion around radiator piping deck penetrations.
- Boat Deck Forward Passageway: Replace overhead and lighting.
- Boat Deck: Replace carpeting throughout passageways, foyers, and entryways.
- Boat Deck: Replace deck coverings and lighting in stairways.

3.2.4 Public Heads

Description

Non-stateroom passenger heads are discussed in this section. These spaces include:

Bridge Deck: Forward Men's and Women's Heads and Showers, Aft Men's and Women's Heads and Showers.

Boat Deck: Forward Men's and Women's Heads, Aft Men's, Women's, and Unisex Heads.

Prior Work

Showers were recently replaced in the Bridge Deck Men's and Women's Heads forward and aft. The Unisex Head was renewed in 2020.

Condition

On the Bridge Deck, the forward Women's Head is in fair condition. Showers are new. The overhead is aged. Corrosion is present around the toilets, including on the bulkhead. The forward

Men's Head is in fair condition. Showers are new. The deck covering is in good condition. Corrosion is present around the toilets. The aft Women's Head toilets and showers are in good condition. Overhead and lighting are in fair condition. Some fixtures show rust. The aft Men's Head toilet and showers are in similar condition to the aft Women's Head. Several ceiling tiles were displaced at the time of the survey, one broken on the floor. There are traces of corrosion around the exterior door and significant corrosion remains below the steam heater.

In the Boat Deck forward Women's Head, the overhead and lighting are in fair to poor condition; lighting diffusers are dirty. Bulkheads appear in fair condition, with small areas of corrosion. The deck covering appears in good condition. There is corrosion on toilet plumbing, and the HVAC vent in the bulkhead is dirty. The forward Men's Head is in similar condition. Toilets appear in good condition, except that water supply plumbing is corroded. Some corrosion is apparent in the bulkhead corner near the urinals and an area of the bulkhead is damaged in one stall. Corrosion is apparent at the radiator pipe penetration and a deck drain.

The Boat Deck aft Women's Head was locked at the time of the survey. The aft Men's Head, just forward of the Unisex Head on the General Arrangement, has been renamed as a Unisex Head. This head is in good condition overall; the overhead, lighting, fixtures, and bulkheads are in good condition, and the deck covering appears in very good condition, including at deck penetrations. One overhead light is missing a diffuser, and the HVAC vent is dirty.

The aft Unisex Head is in fair condition overall. The overhead is in good condition, but light diffusers and the HVAC vent are dirty. The deck covering is in fair to poor condition. Corrosion is apparent around the toilet (which is cracked) and deck drain, and there are three small areas of peeling paint on the bulkhead.

Figure 16 Cracked toilet and corrosion on deck in aft Boat Deck Unisex Head

Figure 17 Aged overhead and lighting diffuser in Boat Deck forward Women's Head

Recommendations

- Bridge Deck forward Women's Head: Repair corroded bulkheads behind toilets, replace overhead.
- Bridge Deck forward Men's Head: Repair corrosion around toilets.
- Bridge Deck Aft Women's and Men's toilets and showers: clean and repair rust on fixtures and on decks, as needed.
- Boat Deck forward Women's Head: Repair corrosion on deck, fixtures, and piping, replace lighting diffusers and overhead.
- Boat Deck forward Men's Head: Replace overhead, repour PRC deck covering.

3.2.5 Solarium

Prior Work

The Solarium overhead and bulkheads were recoated in 2020.

Condition

The Solarium is in fair to good condition. The overhead windows, which were installed in 1999, appear to be in good condition. The overhead electric heaters have no reported issues, although surface corrosion is visible on many of them. The structure outboard and aft of the Solarium is dished between frames and does not drain, leaving a large amount of standing water on deck and along the Solarium bulkheads. There are several cracks in the deck covering large enough to allow substantial water intrusion, which will result in deck steel wastage over time.

Figure 18 Cracks in Solarium deck covering

Recommendations

- Repair the cracks in the Solarium deck covering.

3.3 Crew Habitable Spaces

3.3.1 Officer Staterooms

Description

Most Officer Staterooms are located on the Bridge Deck, with the exception of the Purser's and Chief Steward's Staterooms, which are located on the Cabin Deck. Officer Staterooms and living spaces are generally 1963 and 1978 vintage, with some minor updates over the past 20 years.

Several of the vessel's crew who hold leadership positions have a combined office/stateroom. This can be perceived as inappropriate when closed door meetings with opposite gender crew are necessary. The Chief Mate and 1st Assistant Engineer's Staterooms are where this is most likely to occur.

Condition

Officer Staterooms are in fair condition, with substantial wear and a fair amount of outfitting original to the vessel.

The USCG MCON ruling requires creation of a Safety Center space adjacent to the Pilothouse per SOLAS requirements. This work must be completed in the near future per the MCON ruling, if the vessel is to stay in SOLAS compliance. Plans have been developed to convert the First Engineer stateroom to a Safety Center. During prior surveys, crew noted a preference for repurposing the head in this stateroom as a dedicated head for the Pilothouse in tandem the Safety Center conversion.

Windows are original, single pane, and require continual maintenance to keep in good condition. A current SMR notes that numerous Officer Stateroom windows are no longer operable. Not only do some of them leak, but the inability to open them during hot days in Bellingham can

result in unacceptably high stateroom temperatures. Some wasted steel also exists around window frames.

Carpets are in poor condition. Carpet replacement is a high priority for the crew, particularly in staterooms where it is torn and creating a tripping hazard. Lighting levels are low; however in other surveys some crew have noted a preference for lower light in staterooms. Overhead condition varies throughout the deck. Furniture is of 1978 vintage and may require replacement or repair in the upcoming years, especially as drawers and drawer sliders begin to fail.

The Officer Staterooms have individual toilets and showers. Surfaces within heads and showers have fair to moderate corrosion, and it is suspected that the steel deck under the toilets in these spaces needs repair. Deck coverings have been renewed or renovated on a piecemeal basis. Some toilets are wall-mounted rather than deck-mounted, making them more difficult to maintain.

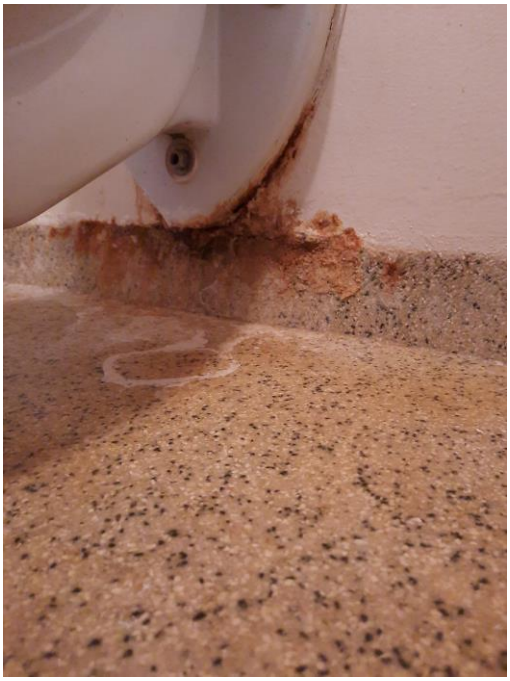


Figure 19 Bulkhead mounted toilet with corrosion in Officer Stateroom

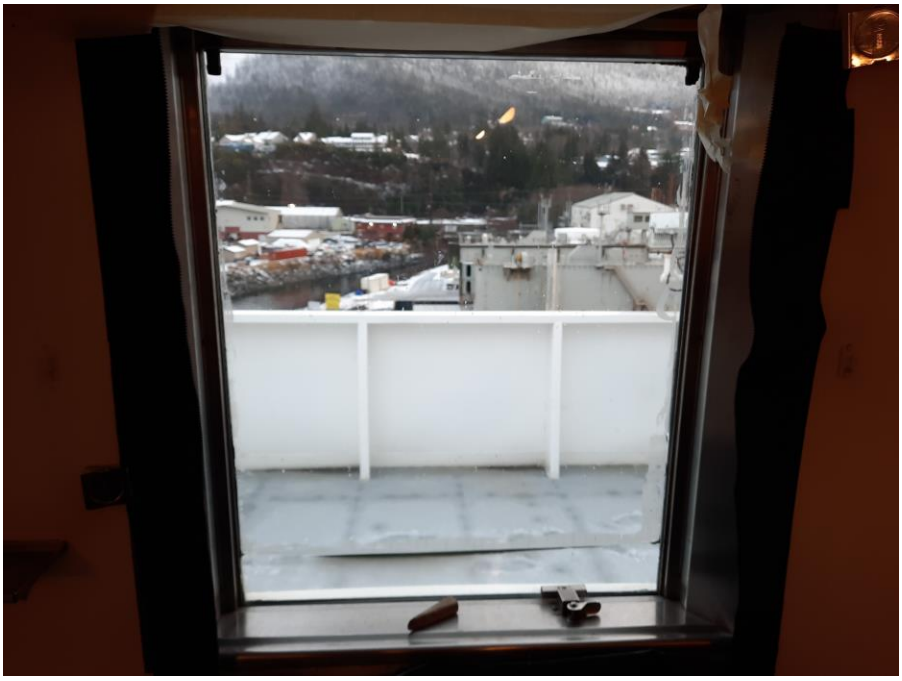


Figure 20 Single pane window in 2nd Mate Stateroom

Recommendations

- Convert the First Engineer stateroom into a SOLAS-compliant Safety Center per USCG's MCON ruling.
- Repurpose the crew head in the First Engineer stateroom to be a dedicated head for the bridge once the space is converted to a Safety Center.
- When the Safety Center is added to the Bridge Deck, configure it to accommodate a shared office/conference room for mixed gender discussions.
- Replace toilets in the Chief Mate's, Second Mate's, Third Mate's, and Second Engineer's Staterooms with deck-mounted flanged units to facilitate better leak detection and repair.
- *Replace Officer Stateroom carpets.*
- Replace outdated furniture.
- *Replace Officer Stateroom windows as needed, repairing surrounding steel where necessary.*

3.3.2 Crew Staterooms

Description

Crew Staterooms are located primarily on the Second Deck, with a handful located on the Gallery Deck. The crew staterooms and living spaces are generally 1963 and 1978 vintage, with some minor updates over the past 20 years.

The Gallery Deck crew's quarters have communal unisex heads and showers. There is a notice posted on that deck encouraging only one crew member to use the shower or toilet spaces at a time, and to ensure the doors are locked, indicating there may have been issues with the unisex multi-person toilets. The Second Deck crew quarters are divided into forward and aft sections.

Prior Work

Carpeting was renewed in the aft Second Deck crew staterooms in 2017. The Steward's Stateroom received some updates in 2022. Several Gallery Deck and Second Deck crew staterooms received new carpet in 2022; however, this work disturbed some ACM and resulted in a temporary work stoppage on the vessel. Subsequently after remediation, some steel work was done following USCG inspection and UT testing.

Condition

The Gallery Deck and Second Deck crew staterooms were inaccessible at the time of the survey due to disturbance of ACM underlayment during the course of shipyard work. Other than some carpet and steel replacement, however, crew reported no changes to these spaces since the 2021 survey.

The Gallery Deck crew's quarters are in fair to poor condition. Furniture and furnishings are dented, chipped, scratched, and broken, e.g., drawers do not close, latches do not latch, etc. The heating system is reportedly inadequate on cold winter days.

The Gallery Deck crew's quarters are served by communal unisex heads and shower rooms. These facilities are outdated and are in poor condition. Shower stalls have significant corrosion. In addition, the shared unisex arrangement may not satisfy regulatory requirements for separate shower and toilet facilities for men and women. Further investigation is warranted, including conformance with the Maritime Labor Convention (MLC) guidance.

Passageways around the Gallery Deck crew staterooms are generally in poor condition, particularly bulkhead paint and deck coverings.

The crew accommodations on the Second Deck are in fair condition, with substantial wear in some cases. Corrosion is common in the heads. Bulkheads and furniture show signs of paint deterioration. Carpeting in the aft Second Deck staterooms is newer, having been replaced after sewage overflows. Carpeting in the forward staterooms varies in condition, having been renewed/renovated on a piecemeal basis; a current SMR requests continued carpet replacement in the forward staterooms. Some carpeting replacement took place during the 2022 shipyard period, but the extent of work was uncertain at the time of survey due to disturbance of ACM during the course of this work.

There are no privacy curtains installed in the Second Deck crew's quarters. AMHS makes efforts to avoid mixed gender stateroom assignments, but in past surveys crew have noted that this is not possible in every instance.

Recommendations

- Separate women's and men's heads in the Gallery Deck crew staterooms.
- Renew deck coverings and repaint bulkheads in the passageways in way of the Gallery Deck crew staterooms.
- Address corrosion in the Second Deck Heads.
- Replace outdated furniture in both sets of staterooms.
- Repaint bulkheads in both sets of staterooms as necessary.
- Install privacy curtains around the bunks on the Second Deck.

3.3.3 Crew Heads

Description

These spaces consist of the forward and aft (Engineer's Head) Crew Toilets on the Gallery Deck, and the Galley Crew Head on the Boat Deck.

Prior Work

The deck covering in the aft Gallery Deck Engineer's Head has been retiled by the crew.

Condition

The aft Crew Toilet on the Gallery Deck (Engineer's Head) is in good condition. The lighting, deck covering, and fixtures appear in very good condition. With the exception of corrosion at pipe joints near the toilet and the toilet water supply, the plumbing and HVAC systems appear in fair to good condition.

The forward Crew Toilet on the Gallery Deck was not accessible during the survey due to disturbance of ACM in adjacent spaces.

The Crew Head near the Galley appears in good condition overall; however, corrosion is apparent in several locations. These include on the overhead, on the deck near a bulkhead beam penetration, where the toilet is mounted on the bulkhead, and on piping.

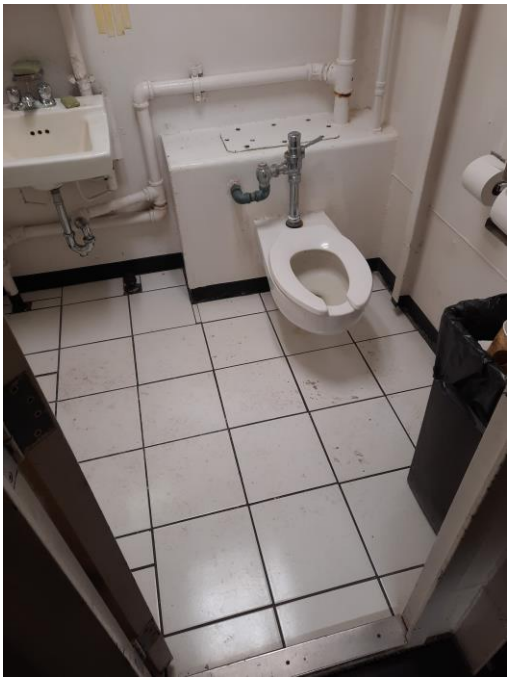


Figure 21 New deck covering in Engineer's Head

3.3.4 Crew Messes and Lounges

Description

These spaces include:

Boat Deck: Crew Mess, Officer Mess.

Gallery Deck: Exercise Area.

Second Deck: forward and aft Recreation Rooms.

Prior Work

Years ago, there was leak from the Officer's Mess to the Cabin Deck below (this was believed to be from the potable water system). A similar leak occurred in the Crew Mess more recently, and steel damage was discovered to be extensive. The Crew Mess deck covering and deck plating have been repaired.

Condition

Lighting is low in the Crew Mess and the Officer Mess; however, some crew prefer lower lighting in these spaces. Overheads in both spaces are dated and air vents are dirty. Deck drains in the Crew Mess show some corrosion. Plumbing fixtures and deck drains in the Officer Mess are in good condition.

The forward Recreation Room was inaccessible during the survey due to disturbance of ACM in adjacent spaces. The aft Recreation Room was in good condition, with a relatively new deck covering.

The Gallery Deck houses the Exercise Area on the aft port stowage flat. The access to this space should be modified, as the vertical ladder can be dangerous for regular crew use.

Figure 22 Vertical ladder access to Exercise Area

Recommendations

- Improve access into the Gallery Deck Exercise Area.

3.4 Crew Workspaces

3.4.1 Galley

Description

Galley spaces include the Galley proper, as well as the Cafeteria Serving Area, Bussing Area, and Scullery.

Prior Work

The Galley was completely refurbished in 1996. During the 2018/2019 repower, the exhaust system was cleaned and new ovens were installed.

Condition

The Galley is in fair to good condition. The deck covering is worn, particularly in high traffic areas, and deck drains show corrosion. The crew previously reported the deck covering is failing and flaking, which clogs the deck drains. The exhaust system appears in good condition.

The Bussing Area and Scullery are both in good condition, although lighting is low and air vents are dirty. The deck coverings in both spaces appear worn but not damaged.

Figure 23 Worn and flaking deck covering in Galley

Recommendations

- Replace the deck covering in the Galley.
- Increase the lighting level in the bussing and scullery area.

3.4.2 Offices

Description

These spaces include the Steward Training Room, the Chief Steward's Office, and the Purser's Office on the Cabin Deck.

Condition

The Steward Training Room, which is aft of the Purser’s Counter, is in good condition.

The Chief Steward's Office has a dated overhead, poor lighting, and worn deck covering.

Currently there is only one printer on the vessel, which is located in the Purser’s Office. When the vessel is busy, this can become a bottleneck. Training space on board is also limited.

Recommendations

- Replace the overhead, lighting, and deck covering in the Chief Steward's Office.
- Provide additional areas for crew to do training and print materials.

3.4.3 Lockers and Dry Stores

Description

The function of several lockers has been altered over the course of the vessel's life and since the last revision to the General Arrangement drawing. Most notably, the Video Game Room on the Boat Deck has been converted to an equipment storage locker, the Engineer's Stores Locker located amidships on the Main Deck has been converted to an emergency gear locker, and the Gift Shop is being repurposed as the Junior Engineer's locker.

Condition

The lockers and storerooms on the vessel are generally in fair condition, with their condition little changed since the 2021 survey. Lockers noted as needing deck recoating include the Bosun's Stores, Boat Deck Bar Stores, Engineer's Stores, Garbage Compactor Locker, and Cart Storage.

Lighting is also low in many of the lockers, making it less convenient to find stored items.

Figure 24 Main Deck Emergency Gear Locker

Recommendations

- Recoat decks in Bosun's Stores, Boat Deck Bar Stores, Engineer's Stores Locker, and Garbage Compactor and Cart Storage.
- Improve locker lighting throughout the vessel.

3.4.4 Workshops

Condition

The Engine Room and Main Deck workshop areas are in good condition. Deck coatings are worn but functional. Lighting is good in both spaces.

Figure 25 Main Deck Workshop

3.4.5 First Aid Room

Description

The First Aid Room is located amidships on the Cabin Deck.

Condition

The First Aid Room is in good condition. The space is worn, but there is no visible damage.

The head within the space is in good condition. The head's door swing contacts a light in the overhead.

Crew have noted in the past that the current layout makes it very hard to attend to passengers. Storage is lacking and the space is quite small. The Cabin Deck refurbishment project required as part of Matanuska's MCON ruling involves removal of all existing spaces, including the First Aid Room. The current plans include rearranging the space by swapping the location of the bed and cabinets to open more space in the center of the room and slightly increasing the size of the First Aid Room Head.

Recommendations

- Ensure that the space allotment and arrangement of the renewed First Aid Room are more conducive to attending to passengers.

3.5 Engineering and Control Spaces

3.5.1 Pilothouse and Wing Stations

Prior Work

During the 2018/2019 repower, much of the bridge equipment was replaced and modifications to the bridge wing station controls were completed. Ceiling tiles in the Pilothouse were renewed around 2020.

Condition

The Pilothouse is in good condition, with numerous recent updates. The carpet is in good condition. The exterior wing stations located port and starboard of the Pilothouse are also in good condition.

The aft bulkhead in the Pilothouse is quite crowded with required equipment and provides little room for more additions. Once the SOLAS-required Safety Center has been added on the Bridge Deck, crew would like to see some of this equipment relocated into that space.

Figure 26 Port wing station

Recommendations

- Move the GMDSS and any other equipment that does not need to be in the Pilothouse into the Safety Center to free up bulkhead space.

3.5.2 Engineer's Operating Station

Prior Work

During the 2018/2019 repower, structural, electrical, and cosmetic changes were completed in various engineering spaces. Work included Engineer's Operating Station (EOS) room expansion, renewed insulation, LED light fixture installation, and a new console.

Condition

Following the EOS upgrade, machinery space ventilation supply ducting passes directly through the EOS from surrounding machinery spaces. The crew have reported very high noise levels due to location of ventilation fan noise emanating from the ducting. At minimum, noise levels should be measured, noise sources determined, and mitigation strategies developed to reduce the noise levels to acceptable levels.

Figure 27 EOS with adjacent Engine Room ventilation supply ducting

Recommendations

- Perform a noise study and develop a noise mitigation strategy for noise levels in the EOS.

3.5.3 Main Machinery Room

Prior Work

During the 2018/2019 repower, structural, electrical, and cosmetic changes were completed in various engineering spaces. In the Main Machinery Room, work included replacing existing lighting with new LED fixtures, bilge cleaning, and installation of new machinery deck plates, overhead rail and trolley, and emergency escapes.

Condition

The Main Machinery Room is in good condition, including overheads, lighting, and bilge coatings. Second Deck-level deck plate coatings are worn but functional.

3.5.4 Auxiliary Machinery Room

Prior Work

During the 2018/2019 repower, structural, electrical, and cosmetic changes were completed in various engineering spaces. Work in the Auxiliary Machinery Room included replacing existing lighting with new LED fixtures; cleaning the bilge; installing new machinery deck plates, overhead rail and trolley, and emergency escapes; and changing structure due to fuel tank modifications.

Condition

The Auxiliary Machinery Room is in good condition. Lighting and overheads are in good to very good condition. Second Deck-level deck plate coatings are worn but functional.

3.5.5 Emergency Generator Room

Condition

The Emergency Generator Room is in fair condition. Lighting in the space is adequate. Deck coatings show some wear and there is dishing in the deck near the generator set.

Figure 28 Emergency Generator Room deck coatings

Recommendations

- Renew deck coatings in the Emergency Generator Room.

3.5.6 Bow Thruster Room

Condition

The Bow Thruster Room was inaccessible during the 2022 survey due to disturbance of ACM in adjacent spaces. A current SMR requests repairs to the double bottom tank top in the BT Room; there is currently heavy scaling and pitting. This recommendation is captured in the Tanks, Voids, and Bilges section.

3.5.7 Steering Gear Room

Prior Work

During the 2018/2019 repower, handrails, gratings, and support structure in the Steering Gear Room received work. This space was also cleaned and painted.

Condition

This space is in good condition.

3.5.8 MSD Room

Condition

The MSD Room is in fair condition overall. The overhead and lighting are in good condition. The bilge coatings are worn and there is corrosion in places, but recent work in the bilge, including new steel, is apparent on the starboard side near the MSD units.

Figure 29 MSD Room bilge steel repairs

3.5.9 Shaft Alley

Prior Work

During the 2018/2019 repower, structural, electrical, and cosmetic changes were completed in various engineering spaces. Work in the Shaft Alley included replacing existing lighting with new LED fixtures and cleaning the bilge.

Condition

The Shaft Alley is in fair to good condition. The space is well lit. Mild corrosion was present in various areas of the bilge.

3.5.10 Fan Rooms

Description

Matanuska's Fan Rooms include:

- #1 on the Gallery Deck.
- #2 on the Boat Deck.
- #3 on the Second Deck.
- #4 on the Second Deck.
- #5 on the Cabin Deck.
- #6 on the House Top Deck (in Stack).

- #7 on the Boat Deck.
- #8 on the Cabin Deck.
- #9 on the Cabin Deck.

Prior Work

A Bridge Deck Fan Room steam reheater reported leaking in the 2021/2022 survey has been repaired.

Repairs to Fan Room #6 wiring and kicktubes were completed during the 2022 shipyard period. Some steel deck plate was also being replaced in Fan Room #2 during the 2022 survey.

Condition

With one notable exception (the Fan Room #5 plenum), fan rooms on the Matanuska are in fair condition. The lagging on ductwork and piping is in fair to poor condition depending on the space. Bulkheads and deck coatings are in fair condition. Lighting levels are low in several Fan Rooms.

The plenum connected to Fan Room #5 is in very poor condition, as reported previously. Corrosion is extensive and coatings have failed entirely on large portions of the deck and bulkheads. Cable glands penetrating through the deck show heavy corrosion. Ductwork shows heavy rust.

A new SMR calls for repairing holes in the deck of Fan Room #7 that allow water into the Engine Room Fidley and violate the fire boundary. UT testing is being performed during the current yard period.

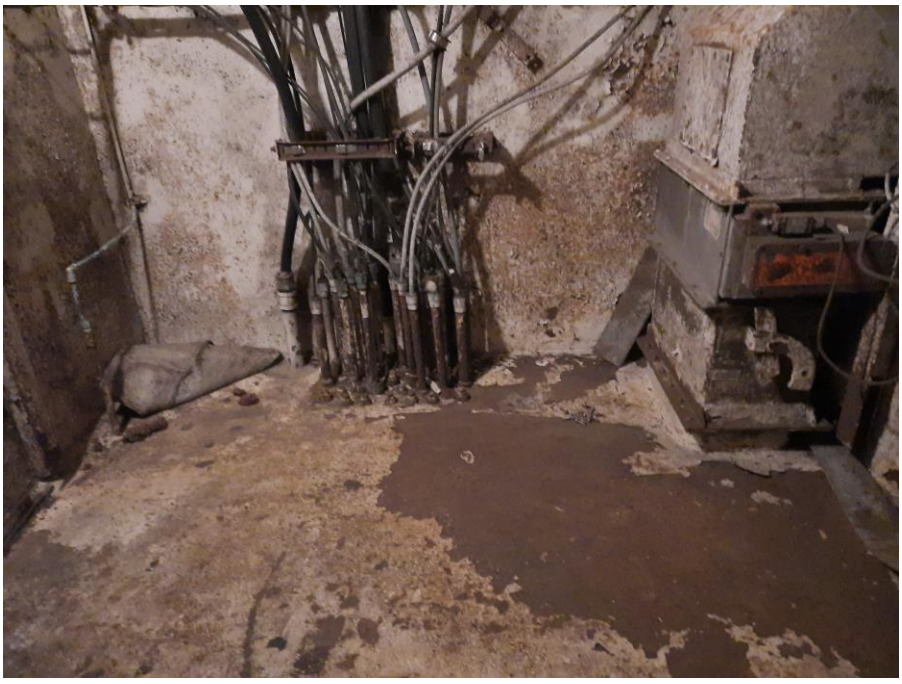


Figure 30 Fan Room #5

Figure 31 Fan Room #5

Recommendations

- Replace damaged/worn out lagging on ductwork and piping.
- Blast and repair steel as necessary, apply new coatings to deck, bulkheads, and ductwork, and repair corroded cable glands in Fan Room #5 plenum.
- *Repair holes in the deck of Fan Room #7 to restore the Engine Room Fidley fire boundary and prevent water ingress.*

3.5.11 Exhaust Stack

Condition

No issues were reported with the exhaust stack.

Figure 32 Exhaust stack seen from aft

Section 4 Fire and Safety Equipment

4.1 Fire Boundaries and Insulation

4.1.1 Doors - Fire, Fire Screen, Weathertight, and Watertight

Description

Matanuska's fire screen doors are fitted with a magnetic holdback system, which is remotely released from the Pilothouse. The doors are monitored by the fire detection system to ensure they close during an emergency.

Prior Work

Some doorframe maintenance occurred during the 2021 shipyard period, including on a Bridge Deck weathertight door on the starboard side.

Condition

The majority of the fire doors and fire screen doors are original ship's equipment and are in fair condition. Crew noted in past surveys that some doors need the latches replaced or repaired, as they are worn out. During the 2021 survey, the Captain noted a desire to add a new automatic fire screen door in the Car Deck stairwell. This would require an update to the fire plan. This work has not yet taken place.

Weathertight doors throughout the vessel are in fair condition; crew did not note any requiring near-term replacement during the survey.

4.1.2 Structural Fire Protection

Prior Work

Prior to the 2018/2019 shipyard period, a gap analysis was conducted to identify upgrades needed to bring Matanuska into compliance with applicable SOLAS regulations. Discussions between AMHS and regulatory bodies resulted in a list of work to be completed in phases. Upgrades to the vessel's structural fire protection were agreed to be completed in a three-phase strategy, with Phase 1 completed during the 2018/2019 shipyard period. During Phase 1, Frame 89 was insulated to A-60 throughout all decks and the aluminum house (Bridge Deck) was insulated to meet designated fire ratings.

Phase 2 and Phase 3 include additional main vertical zone insulation upgrades to meet applicable SOLAS regulations. The majority of this work will upgrade existing identified A-0 MVZ bulkhead and decks to A-60. Remaining A-class bulkheads and decks throughout the vessel should be upgraded to A-30 and A-60 insulation, where required, within five years of completing the 2018/2019 shipyard period.

All other structural fire protection remains subject to the SOLAS requirements in place prior to the MCON decision.

Condition

Structural fire protection is generally in good condition. At the time of survey, Phase 2 and Phase 3 required upgrades had not yet been completed.

Recommendations

- Complete Phase 2 and Phase 3 additional main vertical zone insulation upgrades to meet applicable SOLAS regulations.

4.1.3 Fire Dampers

Description

Vehicle Space ventilation system fire dampers are automatic and remotely controlled to enable rapid system shutdown in case of a fire in the space.

Condition

Accommodation ventilation dampers and louvers are aging and are difficult to access for maintenance. Issues with corrosion, rust bleeding, access, and controls have been reported. Recommendations for this issue are captured in the Accommodation Space Ventilation section.

Intake louvers for the Vehicle Space ventilation system also show substantial corrosion. No issues were reported with the fire dampers associated with these louvers, but they should be monitored and regularly tested for operational issues resulting from corrosion.

4.2 Fire Suppression Systems and Piping

4.2.1 Automatic Sprinkler System and Piping

Description

Matanuska is fitted with a fully automatic, wet pipe sprinkler system serving the accommodation spaces. The system has a dedicated seachest, sprinkler pump, and two pressure tanks located in the MSD Room. The system was installed in 1996 and meets all current regulatory requirements.

Prior Work

The sprinkler system pressure tanks received weld repairs in February 2018.

Condition

The accommodation sprinkler system’s pressure tanks are located in the MSD Room. The inspection hatch covers are corroding on both tanks, and the Chief indicated that there are no spares available as the manufacturer is no longer in business. As such, the tanks should be replaced in the near future. This is a high priority item; the automatic sprinkler system is critical for the vessel’s safety, and the vessel cannot sail if the system is inoperable.

No major issues with the sprinkler system's piping were noted by the crew. However, substantial coating degradation and some corrosion were observed on a section of sprinkler piping in the overhead of the Solarium.

Figure 33 Corroded inspection hatch covers

Figure 34 Accommodation sprinkler system pressure tanks

Figure 35 Damaged coatings and corrosion on piping in Solarium overhead

Recommendations

- Replace the accommodation sprinkler system pressure tanks.
- Recoat and/or replace the damaged section of sprinkler piping in the Solarium overhead.

4.2.2 Manual Deluge Sprinkler System and Piping

Description

Matanuska is fitted with a dry-type, manual deluge sprinkling system serving the Vehicle Space. The system is charged with seawater from the firemain and meets all current regulatory requirements.

Prior Work

The original manual deluge piping was replaced in 2001 using 90:10 CuNi piping. The pumps servicing this system were replaced during the 2018/2019 repower. Outdated motor operated valves that were reported as issues in the 2020 survey report were subsequently replaced.

Condition

No issues were reported with this system.

4.2.3 Firemain System

Description

The firemain is a manually activated, dry-type system. The primary firemain pumps and all associated suction and discharge valves can be remotely operated (or monitored, valves only) from the EOS. The suction and discharge valves are normally aligned for operation of the firemain pump and are accessible above the deck plates.

Prior Work

The firemain system was upgraded to meet SOLAS requirements, following USCG guidelines, during major SOLAS upgrades in 2008-2009.

Condition

The system is in good condition after the 2018/2019 repower. The steel piping throughout the Engine Room, Auxiliary Machinery Room, and Shaft Alley was replaced with copper nickel. Fire hose station valves were renewed where necessary, and two of three fire pumps were replaced. The fire pump motors were retained. Fire Pump No. 3, original to the vessel, is old but is currently functional. However, it is a different make and model than the other two fire pumps, which is a maintenance burden.

Figure 36 Firemain piping and #2 fire pump located in Main Engine Room

Recommendations

- Replace Fire Pump No. 3 with make and model consistent with the other two fire pumps.

4.2.4 Engine Room Suppression System

Description

A fixed CO2 system protects the Engine Room and Auxiliary Machinery Room. When activated, the CO2 floods both machinery spaces simultaneously with no option for individual space suppression.

Prior Work

During the 2000/2001 shipyard period, additional CO2 storage cylinders were installed and piping modified to simultaneously flood machinery spaces with CO2, as mandated by the USCG and SOLAS. This is because the two spaces are in direct communication via an opening in the uptakes to allow the ventilation air from the AMR to exhaust through the MMR.

The main and auxiliary engines and the oil-fired boiler were fitted with a fixed, local application fire suppression system (LAFF) in 2004 to meet SOLAS regulations.

In February 2014, the pressure switches for the fixed CO2 system were relocated outside of the spaces that they serve.

During the 2018/2019 repower, sections of the LAFF system protecting the lube oil and fuel oil purifiers were replaced. The LAFF system controller was also upgraded, and all LAFF water mist piping and sprinkler heads in the Engine Room were removed and reconfigured.

Condition

The crew did not report any issues with the CO2 or LAFF systems.

4.2.5 Emergency Generator Suppression System

Description

A smaller, independent fixed CO2 system protects the Emergency Generator Room.

Condition

The system meets all the current regulatory requirements, is regularly inspected by the USCG, and no issues were reported.

4.2.6 Paint Locker Suppression System

Description

A fixed CO2 system protects the Paint Locker.

Condition

The system meets all the current regulatory requirements, is regularly inspected by the USCG, and no issues were reported.

4.2.7 Galley Suppression System

Description

The Galley has an in-duct exhaust system and Gaylord hood to prevent the spread of and extinguish a fire on the hot cooking surfaces or in the Galley exhaust ventilation system.

Prior Work

This system was tested to the satisfaction of regulatory bodies during the 2018/2019 repower. Alexander Gow personnel indicated at that time that the nozzles were obsolete and incorrectly placed. The Chief Engineer reported that this issue was resolved in 2020.

Condition

No issues were reported with this system.

4.3 Alarm and Monitoring Systems

4.3.1 Centralized Fire Detection and Alarm System

Description

The ship is protected by a centralized fire detection and alarm system meeting the current ABS/USCG/SOLAS regulations. This system also monitors the position of the fire screen doors (doors magnetically held open) to alert the crew should a door fail to close.

Prior Work

The 2018 survey reported that the existing Cerberus system was very maintenance intensive and unreliable. This system was replaced with a Consilium Fire Detection system during the 2018/2019 repower.

Condition

No issues were reported with the new Consilium system.

4.3.2 Vehicle Space Alarm and Monitoring System

Description

A leak detection system, a door-open indication system, and a vehicle door video surveillance system protect the Vehicle Space. These systems have all been installed since 1996. The Vehicle Space is also monitored with CO and LEL monitors.

Prior Work

During the 2000/2001 shipyard period, doors and hatches leading from the Vehicle Space down into the vessel were fitted with door-open indicators and alarms to alert the crew of potential downflooding concerns. The Vehicle Space CO and LEL monitoring system was replaced around 2020.

Condition

No issues were reported with the leak detection, door-open indication, or the CO and LEL monitoring systems.

The car door video surveillance system is obsolete; there is a recommendation for its replacement in the closed circuit television (CCTV) section.

4.3.3 Machinery Alarm and Monitoring System

Prior Work

New integrated monitoring, alarm, and control system (IMACS) software, hardware, panels, control, cabling, and required uninterruptible power system (UPS) were installed as part of the vessel repower in 2018-2019. The system has two independent networks (control and supervisory). The vessel was outfitted with three operator workstations, one in the EOS, one in the Pilothouse, and one in the Chief Engineer's stateroom.

The IMACS installation included modifications and integration of pump and valve control panels, ventilation controls and alarms, plant monitoring and control field devices (transducers), console process gauges (pressure gauges), tank level indicators, shaft horsepower meters, and bilge alarms.

Condition

The new IMACS works fairly well, with a few recurring issues present since the previous survey. The IMACS sometimes locks up and loses communication, after which the crew must restart it. Sometimes the displays on screen merge, and the system must be restarted. The crew would like to add wireless remote functionality to allow the system vendor, Ockerman Automation, to troubleshoot and update the system remotely. This would allow immediate troubleshooting of failures but may also impact vessel cybersecurity.

Recommendations

- Investigate enabling remote third party access to the IMACS system for troubleshooting and system updates, but consider the cybersecurity implications before implementing.

4.4 Lifesaving Equipment

4.4.1 Lifeboat(s) and Davit(s)

Description

Matanuska now has two lifeboats, one on each side. They are 60-person, partially enclosed boats that meet all current ABS, SOLAS, and USCG regulations. The boats and davits were installed in 1995-1996.

Prior Work

Historically, the lifeboats have had issues with water ingress into their keels and subsequent weight growth. Flotation has been replaced and the keels resealed to attempt to prevent water ingress.

Condition

The lifeboats and davits are regularly inspected by USCG.

Lifeboats were removed from the vessel for maintenance at the time of the survey, so their current condition could not be observed. However, there remains an SMR open since 2021 noting that several lifeboat maintenance items are required per recent SOLAS regulation updates. These include gel coating repair, repainting, reflective material replacement, hull penetration repair, and sponson repair.

Coatings on the davits are still in fair to good condition. It has been noted in the past that the davits are very expensive to maintain.

Recommendations

- *Complete the list of required SOLAS lifeboat maintenance items.*

4.4.2 Liferafts

Description

There are eight 100-person liferafts on Matanuska, four on the port side and four on the starboard side. One of the four on each side is contained within the marine evacuation slide container. The liferafts meet the latest SOLAS regulations for reversible rafts.

Condition

No issues were reported with the liferafts. The liferafts are inspected annually by the USCG.

4.4.3 Fast Rescue / Utility Boat(s) and Davit(s)

Description

Matanuska has two fast rescue boat/davit systems, one located on each side of the vessel. The rescue boats are Willard Marine, Inc Sea Force 670 SOLAS, Model No. WM-670-01. The davits are an Allied Systems DC8600CTS SOLAS FRB Davit Assembly. The release hooks are Cranston-Eagle, Off Load Release Hook Model No. ZAPR-356-C2B-VMX.

Prior Work

The current port and starboard fast rescue boats (FRB), davits, and platforms were installed during the 2018/2019 repower.

Condition

No issues were reported with this equipment. The rescue boats and davits are regularly inspected by the USCG.

4.4.4 Marine Evacuation Slides

Description

Matanuska has two Liferaft Systems Australia (LSA) marine evacuation slides (MESs), one per side.

Prior Work

The current slides were installed in 2008-2009 to replace the previously installed marine evacuation chutes.

Condition

No issues were reported with the MES containers or supporting structure. The MESs are regularly tested and repacked for the USCG.

Figure 37 MES box

4.4.5 Means of Rescue (MOR) Platform and Davit

Condition

The First Engineer reported that the MOR platform has been removed because it was not in a useful location, and the FRB provides a better means for retrieving someone in the water. However, installation of an efficient means of rescue system is required by SOLAS regulations, and use of an FRB is not considered adequate or equivalent to the level of safety provided by the MOR platform.

A current SMR requests installation of an electric retrieval winch for the MOR in the port MES slide box to facilitate raising and lowering disabled passengers in case of an emergency.

Recommendations

- Reinstall the MOR platform in a more effective location.
- *Install an electric retrieval winch in the port MES slide box to facilitate raising and lowering disabled passengers.*

4.4.6 Other Lifesaving Equipment

Description

Matanuska is fitted with sufficient numbers of lifejackets, life rings, emergency position indicating radio beacons (EPIRBs), etc. as required to meet USCG and SOLAS regulations.

Condition

The miscellaneous lifesaving equipment is regularly counted and checked by the USCG. No issues were reported with the equipment.

Section 5 Electrical Equipment

5.1 Ship Service Power Generation

Description

Main electrical power is supplied by three Caterpillar generator sets via a Square-D ship service switchboard. Details of the diesel generator sets, which were installed in 1985, are:

- Engines: Caterpillar 3508DITA, 1200 RPM.
- Generators: Caterpillar SR4, 460V, 560 kW.
- Number of Generators: 3.
- Generator 1 hours: 142,346 as of December 2022.
- Generator 2 hours: 156,806 as of December 2022.
- Generator 3 hours: 154,961 as of December 2022.

The generators are controlled by an electronic governing system complete with auto paralleling. Two generators are needed to carry the load during normal cruising. Three generators are used during maneuvering while utilizing the bow thruster due to the high inrush currents. Each generator averages about 3,000-5,000 operating hours a year, depending on operating schedule. The crew rotates generator usage to spread generator overhaul periods across several years.

The crew has reported that the engine blocks have already been fitted with the largest possible cylinder liners. No further conventional means of rebuilding these engines is available.

The crew has transitioned to a condition-based maintenance program, which requires the generator vendor, NC Power, to inspect the gensets and develop a maintenance plan, which is adjusted on a regular basis. This is a movement away from the traditional running hour-based maintenance program.

Prior Work

Generator 1 was rebuilt in 2011 and received a top end overhaul in 2017. Generator 2 received a top end overhaul in 2017, and Generator 3 received a top end overhaul in 2015. During the 2018/2019 repower project a new generator control system, Woodward easYgen 3000, was installed that provides start, stop, and paralleling functionality for all ship service generators from the EOS and integrates with IMACS. A new Square-D ship service switchboard was installed during the 2018/2019 repower.

Condition

Ship service generator replacement is likely necessary to ensure the extended life of the vessel now that the main engine repower is complete. Sizing of the new generators depends on whether a new bow thruster is installed in tandem. If a larger bow thruster is installed, larger generators and modifications to the switchgear will be required. During the 2022 survey, the Chief Engineer noted a preference for CAT C32's.

The existing gensets are old but have been well maintained. The front and rear crankshaft seals on the diesel generator engines are no longer available. If the generator repower is delayed, purchasing custom replacement parts or modifying the engines may be required. Load on the generators is lower than desirable.

The Chief Engineer reported that since the repower, the switchboards have not been not well coordinated with the gensets. The engine controls/governors were receiving some upgrades around the time of survey to address this issue.

Figure 38 Ship service diesel generator

Recommendations

- Replace generator sets during a future CIP.

5.2 Ship Service Power Distribution

Description

The ship's service power distribution system is largely original equipment, although numerous notable replacements occurred during the 2018-2019 repower.

Prior Work

The main ship service switchboard was replaced as part of the repower project. Motor control centers (MCCs) and power cabling from both switchboards and MCCs were all replaced as well, with the exception of two Cabin Deck ventilation fans – the No. 1 and No. 3 forward/mid ventilation fans – located in Fan Room 5. During switchboard replacement, cables were replaced up to the first device.

Condition

AHMS contracts for annual thermal imaging surveys to find electrical hot spots. Measurements are typically taken on the main switchboard, MCC panels, various distribution panels, and on various electrical equipment. Emergency electrical equipment is also typically tested. Menezil Engineering surveyed Matanuska's electrical system in September 2022. The following overheated areas were found:

- Port main engine distribution panel Breaker P-460 was overheated internally.
- Fidley Compressor Unit #2 had two overheated fuses.
- Car Deck lighting panel MVZ-2 had two overheated wire terminals.

- The #3 MSD control panel's bottom wire terminal (6T3) was overheated.
- The #2 MSD control panel's Contactor Cell #2 had two overheated wire terminals.
- The #1 MSD control panel's Contactor Cell #1 had two overheated wire terminals.

A copy of the Menezil Engineering September 2022 survey report is provide in Appendix C.

Matanuska's 120VAC distribution transformers are mostly original and should be more thoroughly examined (opened, inspected, infrared tested). Transformers are reported to have a 20- to 30-year life expectancy before the encapsulation begins to break down, eventually causing equipment failure. Failure of these transformers will impact basic lighting and other services on the vessel. This may cause the ship to be taken out of service or reduce its mission capability. The crew noticed one transformer under the forward Gallery Deck stairtower near the crew staterooms buzzing loudly.

Electrical cables typically reach the end of their effective service life (when the insulation begins to break down) at about 30 years. The majority of cabling is still original Mil-C-915 spec (not low smoke or low toxicity) cable, now 60 years old. AMHS should have all existing cable that was not replaced in the repower project meggered and replaced as required. It should be anticipated that a majority of the existing cabling will likely require replacement due to poor megger results. Original exterior, vital load, and emergency lighting cabling should be considered for replacement first.

The lighting systems on board appear to be in good condition. The insulation on the lighting cables is very old, however, and will eventually break down (see the cable discussion above). Lighting in many spaces is lower than modern illumination standards.

The number and location of outlets in public spaces is not sufficient to meet modern needs of passengers and crew. If any of the passenger or crew spaces are significantly refurbished, AMHS should replace as much of the cable as practicable at that time. As part of major refurbishments, it is recommended to increase the number of power outlets in all spaces.

The vessel experiences some power fluctuations during its runs. The crew previously suggested installation of a large UPS for the elevators, as operating the elevator while operating the bow thruster can cause power fluctuation issues. The cause of these power fluctuations should be determined and corrected.

Some of the power panels cannot be locked, and those with locks are not all on the same key. It would be prudent to have all the electrical panels locking with the same master key.

A new SMR requests that the generator controls and/or automation system be configured with automatic load shedding to trip selected circuit breakers on the main switchboard in the event generator load goes above preset load values. This load shedding function would keep the vessel from having an overload condition and potential vessel blackout, which could directly cause a grounding incident or serious marine casualty.

The crew also requests that the switchboard control power be connected to the redundant 24VDC system that the generator engines use for control power. The current control power supply for the switchboard, a Phoenix Contact 24/24VDC UPS module, is basically a computer network power supply. These modules have been found to be prone to failure. The vessel has had five of the modules fail in the past year.

Recommendations

- Address overheating of port main engine distribution panel Breaker P-460.
- Address overheating of two Fidley Compressor Unit #2 fuses.

- Address overheating of Car Deck lighting panel MVZ-2 wire terminals.
- Address overheating of the #3 MSD control panel's bottom wire terminal (6T3).
- Address overheating of #2 MSD control panel Contactor Cell #2 wire terminals.
- Address overheating of #1 MSD control panel Contactor Cell #1 wire terminals.
- Investigate the loud/buzzing transformer under the forward Gallery Deck stairtower.
- Replace the legacy transformers along with the generators in a future CIP.
- Megger and replace remaining legacy cabling, including lighting cabling.
- Add more power outlets in public spaces during the next major refurbishment.
- Conduct a power systems study to determine the cause of the power fluctuations.
- Replace the remaining two original motor controllers for ventilation fans 01 and 03 located in Fan Room 5 and serving the Cabin Deck.
- *Configure the generator controls or automation system to trip under voltage-tripped breakers on the main switchboard in the event a generator goes above a set load value.*
- *Connect switchboard control power to the redundant 24VDC that the generator engines use as control power.*

5.3 Emergency Power Generation

Description

The emergency diesel generator (EDG) set is as follows:

- Engine: Caterpillar 3406, 1,800 RPM
- Generator: Caterpillar SR4B, 480 volt, 250 kW
- Number of Generators: 1
- EDG hours: 756 as of December 2022.

The First Engineer reports that the EDG accrues less than 24 hours run time per year.

Prior Work

The EDG was installed in 1997.

Condition

There were no reported operational problems with the emergency generator. A current SMR notes that a crack exists in the emergency generator radiator air diffuser mount. The crack was filled with RTV but requires a permanent repair.

Recommendations

- *Repair the emergency generator radiator air diffuser mount.*

5.4 Emergency Power Distribution

Description

The emergency switchboard was installed in 1997. It was designed and built by Lloyd Controls with Square-D parts.

Prior Work

During the 2018/2019 repower it was determined that the breakers on the emergency switchboard did not coordinate properly. In 2019, Glosten conducted a study to determine the risk of this improper coordination. It was determined that there is a minor risk that a high current short circuit on the loads downstream of the emergency switchboard could trip the instantaneous override of the molded case switch or bus tie breaker to the ship service switchboard. Circuit breaker settings were modified to resolve the coordination issue.

Condition

The distribution system has been approved since the switchboard modification, and there have been no additional reported problems with the emergency system. Distribution panel boards are of the same makes and models as the ship service system.

There is no remote monitoring of the EDG, as all of the gauges and instrumentation for it are located in the Emergency Generator Room. Instrumentation to monitor the EDG from the EOS should be provided but is not critical. One possible solution would be to install video cameras in the EDG room as part of a larger upgrade to the CCTV system.

Recommendations

- Provide for remote monitoring of the EDG, potentially using the CCTV system.

Section 6 Machinery and Auxiliary Equipment

6.1 Main Propulsion

6.1.1 Main Engines

Description

The new engines installed during the 2018/2019 repower are Electro-Motive Diesel (EMD) 16-710G7C-T3. These engines are non-reversing, two stroke, turbocharged diesel, EPA Tier 3, and rated for 4,000 BHP at 900 RPM. Hours are as follows:

- Port main engine: 11,900 as of December 2022.
- Starboard main engine: 11,946 as of December 2022.

Prior Work

The vessel was repowered between 2018/2019 to extend its life, provide increased power, and improve engine response for maneuvering. The repowering project involved removal of the main engines, reduction gear, controllable pitch propeller (CPP), shafting and bearings, and installation of new systems and foundations. New exhaust piping was installed for the new engines during the repower.

Condition

No issues with the new engines were reported.

The IMO MARPOL Annex VI requires existing vessels to meet a new set of energy efficiency requirements commonly referred to as EEXI. The Matanuska does not meet the required EEXI value. Complying with EEXI is mandatory to maintaining IMO compliance and consequently SOLAS certification.

Recommendations

- Research ways to reduce the Matanuska's EEXI score in order to remain in IMO compliance.

Figure 39 Starboard main engine

6.1.2 Main Engine and Propulsion Controls

Prior Work

The 2018/2019 vessel repower included complete renewal of the main engine and propulsion control systems. The existing MaK main engine control system and Berg propulsion control system were replaced with a new system that integrates with the IMACS and includes control of the following elements: remote propulsion control in EOS, Pilothouse, Bridge Wings; main engine reduction gears, clutch, and CPP system; and main engine controls.

Condition

No issues with the new controls were reported.

6.1.3 Reduction Gears

Description

The reduction gears were replaced 2018/2019 vessel repower with Rolls-Royce 225 Kamewa Integrated Reduction Gear CPP System Model R-R, 650 GHC-B. These reduction gears are horizontally offset (650 mm), non-reversing, single reduction type, capable of operating at the full torque of the engine with a reduction input/output ration of 4.64:1.

Prior Work

In late January 2020, the port reduction gear oil cooler experienced a leak, causing the clutch to seize and the port main engine to be placed out of service. Upon investigation, it was determined that the zinc anodes recommended and installed by Rolls-Royce for cathodic protection had been consumed at an aggressive rate. This was suspected to have been caused by galvanic corrosion, although the crew consider high sea water velocity in the cooling system a possible cause as well. The crew has since installed isolation kits throughout the system to eliminate potential galvanic corrosion issues.

Condition

The First Engineer reported that the reduction gear hydraulic pressure relief valves are relieving unnecessarily at low loads. This results in low pressure alarms and the standby pump activating. The issue does not occur at higher loads, i.e. when underway.

A previous issue of control valves sticking has been resolved.

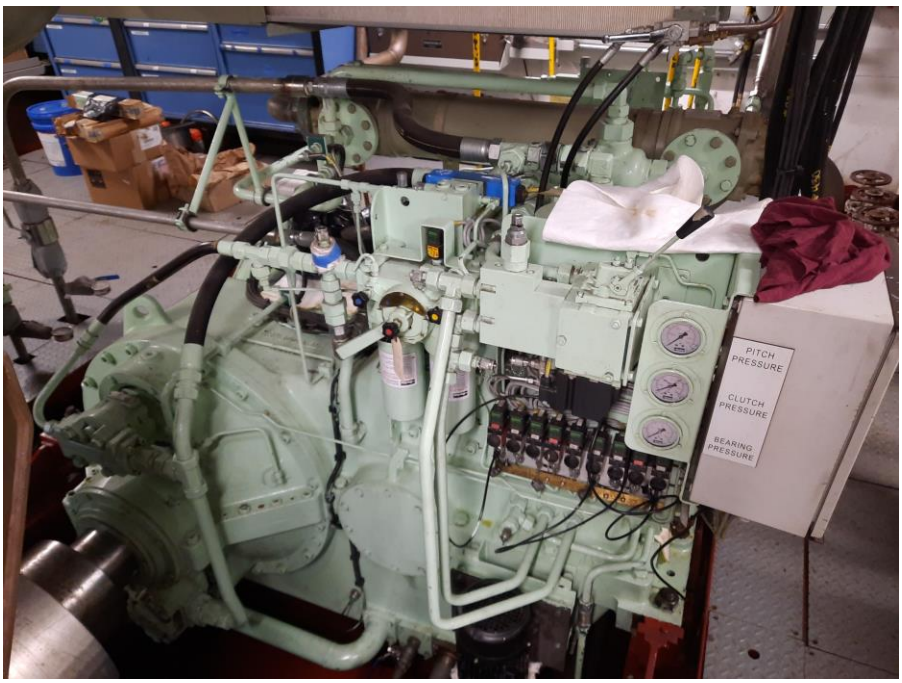


Figure 40 Starboard reduction gear

Recommendations

- Coordinate with Rolls-Royce to troubleshoot the pressure relief valve actuation issue at low loads.

6.1.4 Propellers and Shafting

Description

The new propeller systems installed during the repower are Rolls-Royce Kamewa Type 79A1/4D-B CPP systems. The propellers each have four blades with a 3.2 m diameter.

Prior Work

The vessel repower involved a complete renewal of the shafting and propeller system, including renewal of propellers, shafts, bearings, struts, stern tubes, seals, and monitoring equipment. Renewal of the CPP hydraulic system was also completed.

One shaft was damaged during initial installation and had to undergo repairs in Seattle to fill and straighten the shaft. The system was tested and aligned prior to acceptance in 2019.

Condition

No issues were reported with the propellers and shafting.

Figure 41 New CPPs

Figure 42 Port propeller shaft

6.2 Bow Thruster

Description

The bow thruster is a tunnel type with controllable pitch blades, with a 600 HP AC motor controlled by a soft starter.

Prior Work

The bow thruster was rebuilt in 2010 by Rolls-Royce. The bow thruster controls were replaced along with other propulsion controls during the vessel's 2018/2019 repower. Three alarms were

installed on the bow thruster and integrated into the IMAC system – low oil level, low oil pressure, and hydraulic controller failure.

Three issues reported in the 2020 Fleet Condition Survey report appear to have been resolved to the crew's satisfaction:

1. Soft start failure – Occasionally the bow thruster controls fail; this seems to be due to a faulty reset on the soft start. The Chief indicated that this issue has been addressed.

2. Operation – Operation of the thruster has been challenging since installation, but a new chip installed in 2012 has improved operation.

3. Voltage Sag – Bow thruster starting causes voltage sag on the vessel power system. This issue was reportedly solved recently by changing settings in the soft starter.

Condition

No new issues were reported with the bow thruster following resolution of the three items above. Concerns remain that the bow thruster is undersized, which may have contributed to dock collisions in the past. Replacement is not recommended at this time, however.

6.3 Heating Plant

6.3.1 Oil-Fired Boiler

Description

The oil-fired steam boiler is a Seattle Boiler Model SDW-125-M. It was installed in 1967 and is inspected regularly by the USCG.

Prior Work

The boiler has been through one major incident. In 2007, a firebox explosion occurred due to an incorrectly installed sensor. The explosion caused damage to the fire bricks, which affected flame spread and allowed smoke to blow out. Temporary repairs were made, but in August 2016 a USCG 835 required permanent repair of the damaged boiler components.

Condition

The boiler is very old. The crew reports that it is hard to service dockside because the vessel is dependent on this system when waste heat is not available. Resolving ongoing boiler issues is a high priority item for the crew.

The most pressing issue for the crew is that the fuel pumps are in poor condition and cannot maintain the necessary 200 psi pressure.

During the 2018/2019 repower project, Cascade Power recommended a new burner system. Crew have also indicated during previous surveys that the boiler controls are old and need an upgrade.

Recommendations

- Upgrade the boiler fuel pumps.
- Upgrade the boiler burners and controls.

6.3.2 Waste Heat Boiler

Description

Each main engine exhaust system is fitted with an exhaust gas/waste heat boiler to recover waste heat from the engine exhaust. The waste heat boilers have a 1,000 lb/hr steam production capacity at 100 psi. These boilers are specified to be able to run dry up to 750°F.

Prior Work

New waste heat boilers manufactured by Greens Power were installed and associated piping and controls were renewed during the 2018/2019 repower project.

The waste heat system stop check valves had issues previously; these issues were addressed via piping work during the 2021 survey.

Condition

One boiler was approved and operational at the time of the December 2022 survey. The second was functional but awaiting a final operational test for ABS. Two valves that had previously been welded in (instead of bolted) were being addressed at the time of the survey.

6.3.3 Radiators and Steam and Condensate Piping

Description

The steam heaters are original equipment. The steam and condensate piping is steel. Most of the steam valves are currently pneumatically controlled.

Prior Work

The pipe insulation was surveyed in 1990 and determined to be non-ACM.

Condition

Piping leaks are a significant ongoing maintenance issue. There is insufficient capability to isolate sections of this system, which is a major issue during winter layups.

Most of the steam valves are pneumatically controlled. The crew previously indicated that this makes adjustment difficult, and they would prefer electric control for finer adjustment. Separately , the Tustumena crew indicated that they are trialing electric controls; coordination to capture any lessons learned during this trial is advisable for Matanuska.

Multiple radiators and surrounding decks are in poor condition. At least four steam coils have leaks; steam coils around the vessel receive piecemeal repairs but need to be replaced. Crew noted that electric unit heaters would be easier to maintain; however, replacing steam heaters wholesale with electric unit heaters would substantially increase electrical loads beyond levels the current electrical system is designed for.

Figure 43 Aged radiator in officer stateroom

Recommendations

- Include refurbishing the steam heaters in any major habitability improvements.
- Consider electric controls when replacing/refurbishing steam valves.

6.4 Steering System

Steering Gear and Rudders

Description

A new Jastram steering system was installed during the 2018/2019 repower.

Prior Work

Many portions of the steering system were renewed during the vessel's repower, including the existing steering stand and steering gear hydraulic system, along with associated controls and cabling. The rudder, tillers and pintles were repaired and re-brushed during the repower.

The rudders were out of alignment by as much as 7 degrees in 2013. The alignment of the rudders was studied and rectified in 2015.

Issues with the plating around the rudder stock were addressed during the 2018 drydocking.

Condition

Historically, the crew frequently raised concerns about the perceived sluggishness of the steering on Matanuska. However, no issues have been reported since the repower.

Figure 44 Rudders

6.5 Sewage and Wastewater Collection and Treatment

6.5.1 Sewage Collection and Sanitary Piping

Description

Plumbing and sewage drain piping throughout the ship is a combination of steel and 90:10 CuNi.

Condition

The remaining steel piping is in poor condition. In many locations, sections have been cast in concrete to resolve leaking issues.

Sewage system backflooding and odors have occurred in the past in the Second Deck crew staterooms, particularly Staterooms 5a and 7a. As currently configured, there is only two feet of vertical drop between the aft crew heads and the V1 and V2 tanks. This was reportedly not an issue more recently, but it should be monitored. If the issue recurs, it may be necessary to modify drain piping arrangements to nine heads on the Second Deck.

Recommendations

- Replace remaining steel piping in-kind on an as-needed basis.

6.5.2 Sewage Treatment and/or Discharge

Description

The vessel has three (3) Omnipure 55M MSD units. The current MSD system was installed in 2009, replacing an existing MSD system in order to meet the Alaska Department of Environmental Conservation (ADEC) sewage and gray water discharge regulations. The MSD treats both black and gray water using sodium hypochlorite produced by electrochemical cells.

Prior Work

During the 2017 shipyard period, about 40 feet of corroded CuNi piping either side of the V3 sewage tank was replaced. This work was extensive, as sewage discharge pipe is routed through stores, wing tanks, and the Shaft Alley. 90-10 copper nickel pipe is susceptible to corrosion when subjected to high concentrations of sodium hypochlorite.

Condition

The crew reports high maintenance time and cost for the MSD system, which is common on all AMHS vessels that have MSD systems installed. Common sources of issues noted during surveys include book cells and macerator pumps.

Corrosion, both of seawater piping and the area surrounding the MSD units, is a continual problem with the sewage system. Surface corrosion is common in the MSD space, including on decks, bilges, and surrounding equipment, and is believed to be due to the chlorine in the space. At the time of survey, substantial steel replacement had recently taken place in the bilge.

The overboard pump reportedly had numerous maintenance issues due to suction problems in the V2 tank, as the pump often lost suction and could not get it back easily. Lowering the suction line further into the tank was not an option, as the current height corresponds to the required 30-minute “soak-time” before discharge. The issue has been addressed operationally in the past by operating the vessel with a minor starboard list to keep the sewage pump primed. With no ballast tanks for heel, the crew achieved this list through vehicle loading. Adding a suction line on the starboard opposite side of the V2 tank to ensure the pump has suction when listing to starboard was a high priority for the First Engineer, and this work was underway at the time of the survey.

The book cells (electrolysis plates) are another maintenance issue in the MSD system. There are titanium plates inside the cells, which reportedly need replacement at intervals much more frequent than the manufacturer-quoted usable life of 18 months.

Figure 45 V2 tank suction lines

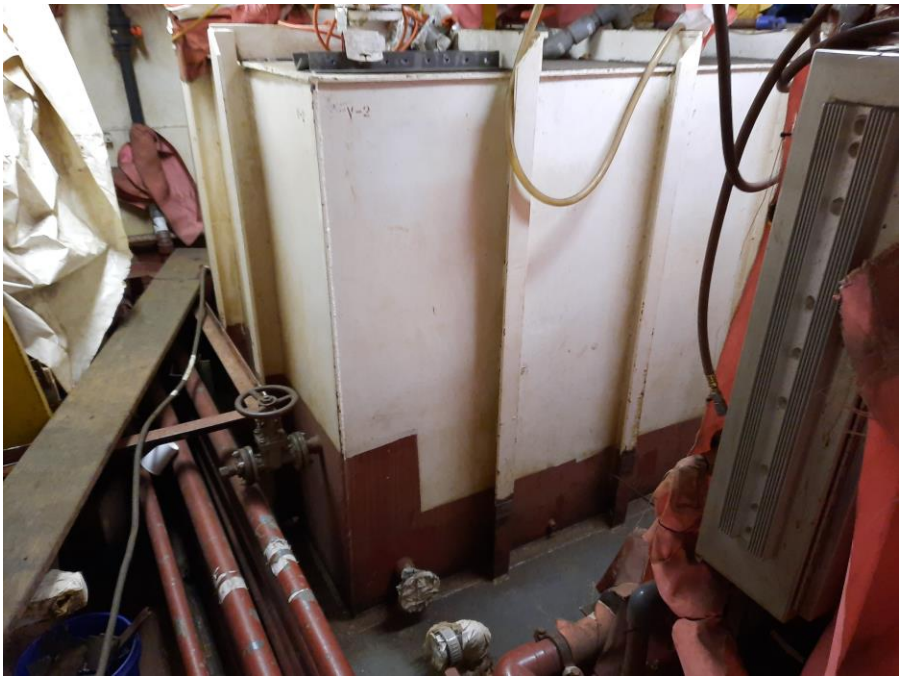


Figure 46 V2 tank

6.6 Seawater Systems

6.6.1 Bilge and Ballast System

Description

The bilge and ballast piping is steel. The oily water separator (OWS) is an Alfa-Tech/Sigma unit installed in 1999.

Prior Work

The bilge and ballast piping has been replaced in a piecemeal fashion as needed due to age and corrosion. Following issues with USCG testing during the repower, a new self-priming bilge pump was installed in 2020.

Bilge alarm level switches were recently replaced in the Engine Room, Auxiliary Machinery Room, and Shaft Alley.

Condition

The crew reported no issues with the bilge and ballast system.

6.6.2 Flushing System

Description

There are two seawater sanitary pumps serving the flushing system.

Condition

No problems were reported problems with the seawater sanitary pumps.

The flushing system piping is 90:10 CuNi and is in acceptable condition. Historically, leaking piping and failing flush valves from the flushing system have been a primary source of corrosion and wastage of interior decks. Unseen leaks lead to destructive corrosion and salt buildup, which

are often not discovered until the damage is quite extensive. Extra attention to inspection and maintenance of the flushing system will help prevent leaks and corrosion in the future.

6.6.3 Seawater Cooling Systems

Prior Work

The generator seawater cooling system piping was replaced in 1984 with 90:10 CuNi piping.

As part of the vessel's repower, new seawater cooling piping, pumps, heat exchangers, and accessories for both new main engines and reduction gears were replaced. New equipment included:

1. Two (2) new seawater circulation pumps (DESMI/NSL200-265B, 40 HP, 1750 RPM, 1320 GPM @ 68 ft TDH).

2. One (1) new stern tube seawater lubrication pump (Aurora/Model 321, 0.75 HP, 3500 RPM, 42 GPM @ 26 ft TDH).

3. Two (2) plate-type seater cooler heat exchangers (Alpha Laval/M10-MFG Combi-Cooler plate heat exchanger, 9420 kBTU/hr).

Condition

As discussed in the Reduction Gear section, the port side reduction gear oil coolers leaked across the heat exchanger tubes, causing the clutch to seize and resulting in the port main engine being taken out of service. While inadequate cathodic protection was considered a potential cause of the leak, crew suspect that high seawater flow velocities in the system may have been contributing to steel erosion in the system. An SMR was filed requesting replacement of cooler discharge ball valves with globe valves to enable better modulation of flow rates. This work was being completed at the time of survey.

Figure 47 Seawater pump and piping

6.7 Freshwater Systems

6.7.1 Freshwater Cooling Systems

Description

The vessel utilizes freshwater for cooling of both refrigeration condensers and the combustion engines via separate systems.

The refrigeration cooling system uses locked-in freshwater from ballast tank No. 9. Piping in this system is carbon steel. The 2000 survey found that this system was marginally sized and therefore could not reject any additional heat into the ballast tank; a larger tank would be required to absorb additional heat. Seawater cooling is instead used for the Ship's Stores refrigeration unit due to the limited capacity of the ballast tank.

The propulsion diesel engines use closed-loop freshwater systems for cooling of various components. Heat is dissipated through freshwater-to-seawater heat exchangers. The jacket water circulation pumps are engine mounted EMD pumps (1050 GPM), as are the after cooler water circulation pumps (250 GPM).

Two 18kW Hotstart CL31804 electric jacket water pre-heat units were installed, one for each main engines. One jacket water transfer pump, an Aurora Model 321, 52 GPM at 45 ft TDH, serves both engines.

Prior Work

During the vessel's repower, new freshwater coolers, expansion tanks, pumps, heaters, and associated piping for both new main engines were installed. Separate low temperature and high temperature jacket water circuits, a preheating system for jacket water, and a single expansion tank serving both systems were installed.

Following the repower, the vessel's main engines experienced overheating issues and could not be run at full power. In late 2021 this was resolved by decreasing the jacket water cooling system bypass orifice plate size and cleaning the freshwater-to-seawater heat exchanger plates.

Condition

No current issues were reported for these systems.

6.7.2 Potable Water

Description

Matanuska has four potable water tanks, two original and two added during the late 1970s to provide additional capacity. The system's piping is copper. Water is circulated via two 100 GPM potable water service pumps and one 10 GMP hot water recirculating pump.

The potable water heater is a Leslie Controls steam heater. The heater is original ship's equipment.

Prior Work

A valve issue had previously been causing cold water intrusion into the hot water system; this issue was reportedly resolved.

Condition

The crew reported no major issues with the potable water system, other than increased maintenance due to age, and indicated that they repair the system on an as-needed basis.

6.8 Fuel and Lube Oil

6.8.1 Fuel Oil System

Prior Work

During the vessel's repower, a large portion of the fuel system for the main engines was replaced and/or modified. Work included:

1. Replacing the fuel oil service system serving each main propulsion engine.

2. Modifying the fuel oil transfer system, including installing two new high-flow coalescing filters between the fuel transfer pumps and the manifold, installing two new duplicate transfer pumps and associated piping, and installing a new suction/discharge manifold.

3. Removing the fuel oil purifiers.

4. Removing the settling tank and installing two new, larger service tanks, and modifying the service system for the auxiliary generators and boilers.

5. Installing emergency fuel shutdown circuits.

Condition

The First Engineer previously suggested repurposing the vessel's lube oil purifier as a fuel purifier (it is the same unit). The lube oil purifier is not needed, but the lack of a fuel oil purifier on board has been an issue; water has previously entered the day tank as a result of the fuel purifier being removed. Crew confirmed during the 2022 survey that this issue is still a concern.

Figure 48 Lube oil purifier

Recommendations

- Modify the lube oil purifier to operate as a fuel oil purifier.

6.8.2 Lube Oil System

Prior Work

During the 2018/2019 vessel repower, the lube oil service system for both propulsion engines was replaced. New transfer and sump pumps were installed. The lube oil transfer system, lube oil purifier system, and slop transfer system were modified as well. Although the centrifugal separators themselves were retained, associated piping was modified and renewed.

Condition

No issues with the lube oil system were reported.

6.9 Compressed Air

Description

Matanuska has three starting air compressors.

Air Compressor No. 1 – Quincy 390. This compressor is the backup compressor and was installed during the 2018/2019 repower.

Air Compressor No. 2 – Quincy 390 with Westinghouse motor. This compressor was installed in 2012.

Air Compressor No. 3 – Quincy 390 with Lincoln motor. This compressor was installed in 2009.

An ALUP 15-HP screw air compressor was installed around 2016 to supply ship service air, reducing the load on the start air compressors and allowing them to be run less frequently.

The two main receiver tanks were installed in 2012. The compressed air system piping is steel.

Prior Work

The previous backup compressor was a Quincy 350 model. It did not use the same parts as the 390 models, making maintenance and repair more difficult. It was replaced with a Quincy 390 model during the 2018/2019 vessel repower project. The compressors are all in good condition.

The backup air receiver was replaced as part of the 2018/2019 repower project.

A large portion of the engine starting air systems was replaced during the previous generator and main engine replacements in the 1980s. The remaining compressed air system piping has been replaced on a piecemeal basis due to age and corrosion. During the vessel's 2018/2019 repower, new piping was installed between the starting air receivers and the new main engines.

Condition

As reported in the November 2021 survey, the two receiver tanks installed in 2012 show signs of corrosion at the openings.

The crew has also previously reported that they are draining the air receivers very frequently. To increase the time interval between draining, the crew plans to install an air dryer in the ship service line.

There were no reported problems with the compressors or compressed air system piping. Typically, one of the compressors is rebuilt each year.

Figure 49 Compressed air receiver tanks

Recommendations

- Address corrosion on the air receivers.

6.10 Ventilation

6.10.1 Vehicle Space Ventilation

Description

Air quality in the Vehicle Space is monitored by a gas detection and monitoring system. The system meets all the current regulatory requirements. Six supply fans and six exhaust fans provide about 60,000 cfm of ventilation air to the Vehicle Space. Automatic fire dampers with remote control capability allow rapid system shutdown in case of fire. The system is fitted with acoustic silencers to keep noise levels within acceptable limits. Intakes are protected by acoustic weather louvers.

Prior Work

The Vehicle Space ventilation system was replaced in 2000/2001 to meet SOLAS regulations. Following the 2021 FCS, Consilium installed new CO and LEL detectors for the Vehicle Space.

Condition

No issues were reported with the Vehicle Space ventilation system.

6.10.2 Machinery Space Ventilation

Description

There are four ventilation fans serving the machinery space ventilation system.

Prior Work

Each of the fans was refurbished during the 2018/2019 repower. In addition, new motor controllers were installed: one (1) Machinery Room exhaust fan (new VFD); two (2) Engine Room supply fans (new 2-speed motor controllers); one (1) Auxiliary Machinery Room supply fan (new 2-speed motor controller).

Condition

No issues were reported with the machinery space ventilation system.

6.10.3 Accommodation Space Ventilation

Description

The accommodation space ventilation systems are 1978-vintage equipment.

Prior Work

Some intake louvers were replaced during the 2018/2019 repower, including the intake louvers of the Cafeteria and aft Cabin Deck.

Condition

There is currently no air conditioning on the vessel, and the crew has indicated that the summer months can be very uncomfortable, with some spaces with sun-exposed boundaries (i.e. solar loading) essentially uninhabitable. The crew's quarters below the Foc'sle (Gallery Deck) are particularly prone to solar heat gain. Air conditioning was historically only supplied in crew quarters and the EOS, and at this time the compressors used for those spaces have been repurposed to cool the Galley stores refrigeration. A current SMR recommends installing a new AC compressor and air-cooled condenser for the Officer Quarters and a new AC compressor for the Gallery Deck staterooms. Another SMR requests installation of split HVAC units in the Vehicle Deck overhead to cool the Purser's Offices, Steward's Office, Information Counter, and adjacent UPS space.

The existing variable air volume system serving the accommodation spaces is antiquated in its equipment and functionality. The heating system controls (thermostats, thermocouples, etc.) are a constant maintenance problem, as temperature control is very difficult and requires constant attention. Many of these valves are pneumatically actuated and do not function well. Replacing these with electric units could be considered if trialing this on Tustumena goes well, as discussed in the Radiators and Steam Heaters section.

Issues with corrosion, rust bleeding, access, and controls of dampers/louvers have been reported. Maintenance is significant because of the age of the equipment and the difficulty of access.

A major overhaul of the Cabin Deck accommodations ventilation system is planned during the MCON-required Cabin Deck overhaul. As part of the overhaul, the expected life of fans, heaters, and other machinery should be assessed and equipment replaced as needed to meet the future needs of the vessel. In addition, the heating system needs to be modified to provide more localized control throughout the ship and increased capacity in some locations; air conditioning should be provided in locations with overheating issues (e.g., Purser's Office and adjacent electronics room, crew's quarters on the Gallery Deck). All ducting should be either thoroughly cleaned or replaced. Cafeteria ventilation should be modified to include filters. Filters are currently installed in air returns from the space.

Recommendations

- *Install an AC compressor and air-cooled condenser for the Officer Staterooms.*
- *Install an AC compressor for the Gallery Deck crew staterooms.*
- *Install split HVAC units in the Vehicle Deck overhead to cool the Purser's Offices, Steward's Office, Information Counter, and UPS space.*
- Perform the accommodations HVAC system upgrades planned as part of the upcoming Cabin Deck refurbishment.

6.11 Refrigeration

6.11.1 Refrigerators

Description

Separate centralized refrigeration systems serve the Galley and Ship Stores refrigerated compartments.

The condenser for the Ship Stores refrigeration system is seawater cooled due to limited cooling capacity of freshwater cycled through the No. 9 Ballast Tank serving the Galley system.

Prior Work

The Galley refrigeration unit was refurbished in 2012. This work included some changes in the Galley and installation of a new set of compressors and a receiver in the Fidley. The receiver was intended to be used with an air-cooled condenser, which has yet to be installed.

The Ship Stores refrigeration machinery was replaced in 2014.

As noted during the November 2021 FCS, Rain Country recently installed new compressors, new control valves, and a modified piping arrangement for the Galley refrigeration.

Condition

No issues with the refrigeration equipment were reported.

6.12 Elevator Systems

6.12.1 Passenger Elevator

Description

The passenger elevator was installed in 1978 during the lengthening project. It is inspected regularly for the regulatory agencies. The elevator control system was replaced around 2005.

Condition

There were issues with the elevator controls after their installation in 2005, but no recent issues with the elevator were reported. As mentioned in the 2021/2022 survey report, the elevator was fitted with an intercom speaker, but it does not function correctly.

Recommendations

- Troubleshoot and if necessary replace the passenger elevator intercom.

6.12.2 Service Elevator and Dumbwaiter

Description

The service elevator was installed in 1978 during the lengthening project. It is inspected regularly for the regulatory agencies.

Prior Work

The service elevator was repaired during the 2018/2019 shipyard period.

Condition

As mentioned in the 2021/2022 survey report, the intercom for the service elevator is unreliable. No other issues with the service elevator were reported.

Recommendations

- Troubleshoot and if necessary replace the service elevator intercom.

Section 7 Deck Equipment

7.1 Anchor Windlass and Chain

Description

The anchor windlass is original ship's equipment from 1963.

Prior Work

The anchor chain is ranged and gauged a minimum of every 5 years for the ABS survey.

Some bolts connecting the anchor windlass to its foundation have been replaced. An issue with the VFD, misidentified as a brake band problem in the previous survey, was addressed in 2021.

Condition

The anchor windlass is routinely rebuilt; no issues were reported during the 2022 survey.

Figure 50 Anchor windlass

7.2 Mooring Capstans and Chocks

Prior Work

The motor for the upper mooring capstan aft (Cabin Deck) was replaced during the 2000/2001 shipyard period.

Condition

The forward mooring capstans are original ship's equipment (1963), but there were no reported problems.

The motor controller on the upper aft capstan is relatively new. Minor surface corrosion is present on the capstan. There is significant wear on the capstan bearing surfaces, which may affect useful mooring line life if this wear damages the mooring line fibers.

During the 2020 interview, the Captain indicated that they would like two aft capstans on the Cabin Deck, as they often need to use two lines in high wind and heavy weather situations. This would also provide some redundancy. The crew rarely use the capstans on the Main Deck, normally only using the one on the Cabin Deck. The lower mooring capstans aft (Main Deck) are old, but there have been no reported problems. These units are regularly overhauled.

Recommendations

- Renew worn coatings on the capstans.
- Consider installing a second aft capstan on the Cabin Deck.

7.3 Vehicle Loading Doors

Prior Work

The port and starboard vehicle loading doors were replaced in 1995/96. The side doors were overhauled in 2008. Both sets of loading doors (side and aft) had their seals replaced during the 2018/2019 repower and were tested for weathertightness.

Condition

No issues were reported with the side doors, but they should continue to be monitored for weathertightness.

Figure 51 Starboard side door

7.4 Stern Door and Ramp

Prior Work

Overhaul of these doors was not included in the 2018/2019 repower project. Sealing gaskets for the doors received maintenance work in 2021.

Condition

The stern doors and associated machinery appear to be in fair condition, and the crew did not report any issues with this equipment during the 2016, 2020, or 2021 surveys other than some locking pin issues in 2020. However, the machinery is aging and has not received a full overhaul in some time. If the stern doors fail, the vessel cannot sail. The crew's proactive maintenance of the doors has so far been sufficient to keep them in good working order; their condition should be monitored closely going forward.

Section 8 Command, Control, Communications

8.1 Navigation Equipment

8.1.1 Steering Stand

Condition

A current SMR notes that the helm station rudder order indicator is small enough that it is difficult to see. Installation of a replacement unit was in progress during the 2023 shipyard period.

8.1.2 Radar

Description

Matanuska has two Racal-Decca Bridgemaster 250 X-band radar units. There are three display units in the Pilothouse (including a Racal-Decca Bright Track day scope). Either radar can output to the third display (day scope) via an inter-switch unit.

Prior Work

New antennas were installed during the 2018/2019 repower.

Condition

No issues were reported with this equipment.

8.1.3 Depth Sounder

Description

A Furuno FE-700 depth sounder display monitor is installed in the Pilothouse.

Condition

No issues were reported with the depth sounder equipment. The transducer and head unit are dated and could be replaced, but they are currently still functional.

8.1.4 Radio Equipment

Description

Matanuska was outfitted with a new GMDSS Area 3 suite in 2022. The installation is required to meet SOLAS regulations.

An additional VHF radio (ICOM) was retained from the original installation to allow communications with non-SOLAS ships and shoreside personnel without affecting the GMDSS-monitored radio frequencies.

The ship also carries an II Morrow Apollo SL40 aircraft scanner.

Condition

No issues were reported with this equipment.

8.1.5 Global Positioning System and Automatic Identification System

Prior Work

During the 2018/2019 repower project, Pacific Radar noted that the DGPS was no longer factory supported, and the primary and secondary pieces of equipment will need to be replaced. Both units have since been replaced.

A new AIS was installed during the 2018/2019 shipyard period.

Condition

No issues with the GPS or AIS systems were reported.

8.1.6 Gyrocompass

Description

The gyrocompass is a Northrop/Grumman/Sperry Marine model NAVIGAT X Mk 1. It was installed during the 2018/2019 repower project.

Condition

The gyrocompass unit is installed in the Pilothouse.,The cooling fan was reported by the crew to be very noisy, but a sound survey conducted by the State's Safety Office found no issues or safety hazards.

Figure 52 Gyrocompass unit in Pilothouse

8.1.7 Weather System

Description

A Young Wind Tracker weather system is installed on the vessel.

Condition

There have been no reported problems with this equipment.

8.1.8 Navigation Lights

Condition

There were no reported problems with the vessel's navigation lights. LED lights could be considered in the future.

8.1.9 Searchlights

Prior Work

The vessel's former 140k candle power searchlights were replaced with 220k in 2021.

Condition

Matanuska operates overnight and through poor weather/visibility. No issues have been reported since the searchlights were upgraded to more powerful units in 2021.

8.1.10 Speed Log

Description

In 2011, the vessel was outfitted with a Stellar Marine ESP 1000 electronic speed pilot system that is integrated with propulsion controls, main engine controls, voyage data recorder, and other instruments.

This system was integrated into the new suite of propulsion and main engine controls during the vessel's repower.

Condition

Stellar Marine speed pilot systems have been troublesome on other AMHS vessels. The system is now no longer supported as the manufacturer is out of business. Although no issues were reported, this system should be monitored closely. The number of critical spares on hand for this system should be noted, and if/when supply becomes limited, the system will need to be replaced.

8.1.11 Voyage Data Recorder (VDR)

Description

The vessel is outfitted with a JRC JCY 1900 VDR system, which complies with SOLAS requirements. The VDR was manufactured in 2014 and installed in 2015. The VDR integrates with the propulsion control system, the electronic speed pilot, the steering system, the engine order telegraph, and other navigation equipment.

This system was integrated into the new suite of propulsion and main engine controls.

Condition

No issues were reported with this equipment.

8.1.12 Bridge Navigation Watch Alarm System (BNWAS)

Description

Matanuska is outfitted with a Furuno BNWAS.

Condition

There have been no reported problems with this equipment.

8.1.13 Electronic Chart Display and Information System (ECDIS)

Description

The vessel is outfitted with Sperry Visionmaster FT ECDIS, which was reportedly installed in November 2011.

The vessel has a TRANSAS electronic charting system, but it is not USCG/SOLAS approved.

Condition

There have been no reported problems with this equipment.

8.2 Communication Systems

8.2.1 Docking Intercom and Talkback Systems

Description

The talkback system is Hose-McCann.

Condition

As on other AMHS vessels, talkback stations located in the weather corrode quickly, but the crew make do with the system. No major issues were reported with this equipment.

8.2.2 Public Address and General Alarm System

Description

The public address and dial telephone systems are Hose-McCann systems installed in 2001.

Prior Work

The public address system was overhauled during the 2018/2019 shipyard period.

The general alarm system was upgraded and overhauled in 1997, including replacement of all system cabling. During the 2018/2019 shipyard period, the crew and shipyard personnel repaired over 15 general alarm bells.

Condition

The public address system is dated, can be difficult to hear, and is difficult to service. The crew indicated that the system is time and maintenance intensive and is due for replacement.

The general alarm system meets all the current SOLAS and USCG regulations. The system is reported to be in good working order.

Recommendations

- Upgrade to a modern public address system.

8.2.3 Sound Powered Telephone and Engine Order Telegraph (EOT)

Description

The vessel's sound powered phone is original ship's equipment. The EOT is a Primer Mover Control (PMC) Type 8202-4000 system.

Prior Work

Renewal of the EOT was completed during the vessel's repower in 2018/2019.

Condition

Replacement cards and equipment for the sound powered phone are difficult to source. Despite the system's age, there were no reported functional problems with the sound powered telephone during the survey.

8.2.4 Satellite and Wireless Communications

Description

A SeaTel antenna and communication system provides off-ship communication and data capability.

Prior Work

Power for the antenna had been temporarily provided to the system by a line conditioner, as the antenna is sensitive to dirty power. The 2019 survey recommended that the system be powered through the UPS located in the Forward Observation Lounge. This work was completed prior to the 2021 survey.

Condition

This system is capable of meeting the basic needs of the crew, but increasing connectivity could improve the reservation system, aid ship operations (maintenance records etc.), and could be used as a source of additional revenue from passengers. AMHS should study options for increasing connectivity for the crew and passengers.

In the 2019 survey, it was recommended that a phone connected to this system be provided in the First Aid Room to improve the ability to work remotely with medical experts. Additionally, a wireless offshore communication system should be provided for pursers to communicate with shore to assist with sick passengers anywhere on the vessel.

Recommendations

- Add off-ship connectivity in the First Aid Room and Purser's Office to improve service for sick passengers and improve reservation capability.

8.2.5 Closed Circuit Television (CCTV) System

Description

Currently the CCTV system consists only of three cameras monitoring the Vehicle Deck loading doors.

Condition

The Panasonic CCTV system is obsolete. Despite attempts to repair and upgrade the system, the crew still reports issues with distorted images and failing cameras. Additionally, too few locations are monitored under the current system. Lack of monitoring is especially an issue at night when fewer crew are on shift.

Upgrading the CCTV system is a high priority for the crew, who would like to see the existing system replaced with a modern system with additional monitoring locations. In addition to monitoring more Vehicle Deck locations, CCTV coverage of some passenger/crew areas should be investigated. Monitoring of normally uncrewed machinery spaces such the Bow Thruster Room, the Steering Gear Room, the MSD Room, the Shaft Alley, and the Emergency Generator Room should be considered. The First Engineer noted that adding a camera outside of the stack to monitor exhaust would be beneficial.

Recommendations

- Investigate feasibility of upgrading the CCTV system and extending monitoring to more locations, including but not limited to normally uncrewed spaces, passenger spaces, and outside of the stack.

Appendix A Fleetwide Regulatory Review

A Regulatory Compliance

A.1 United States Coast Guard (USCG)

All AMHS ferries are subject to compliance with USCG regulations in order to obtain a Certificate of Inspection (COI) and be allowed to carry passengers. The *Lituya* is subject to USCG Subchapter "T" for small passenger vessels. All the other AMHS vessels are subject to Subchapter "H" for large passenger vessels. New regulations are published each year, but a vessel is typically only required to comply with the regulations in effect when the vessel was constructed. There are notable exceptions to this, see Section A.1.2 below.

A.1.1 Fire Protection, Detection, and Extinguishing Equipment Compliance

In 2016, USCG published Federal Register document Fed/Reg 48220-48303, amending its regulations for fire protection, detection, and extinguishing equipment on inspected and uninspected vessels and outer continental shelf facilities. These changes are necessary to ensure USCG regulations remain current and address advances in new technologies. The document was intended to harmonize the USCG's regulations with the appropriate national and international consensus standards for fire protection, detection, and extinguishing equipment.

In April 2018, USCG issued CG-CVC Policy Letter 18-04 providing guidance on implementation of the Federal Register document. The policy letter allows all Subchapter H vessels contracted prior to 18 January 2017 to retain their existing fire extinguishers through their serviceable life. Upon voluntary or involuntary replacement, new extinguishers must meet the new requirements.

AMHS will be required to replace all extinguishers that reach the end of their serviceable life with extinguishers meeting the new requirements.

A.1.2 Major Conversions

The USCG is taking a closer look at all vessel modification projects. Modifications that will "substantially prolong the life of the vessel" as defined under Title 46, USC 2101 (14a) are considered a "major conversion". When modifications constitute a major conversion, the USCG may require, at their discretion, additional modifications to bring the vessel into compliance with all safety standards, arrangements, and system requirements applicable to new vessels.

A.2 Environmental Protection Agency (EPA)

A.2.1 Vessel General Permit

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. EPA's NPDES vessels program regulates incidental discharges from the normal operation of vessels consistent with Section 402 of the Clean Water Act. These incidental discharges include, but are not limited to, ballast water, bilge water, graywater (e.g., water from sinks, showers), and anti-fouling paints (and their leachate).

The centerpiece of the NPDES vessels program is the Vessel General Permit (VGP). The VGP is an administrative method by the EPA to regulate a large number of vessels using one overall permit. This means that independent permits are not issued for each vessel. All AMHS vessels are currently permitted, by means of an electronic Notice of Intent (NOI), or application, that occurred on 10 December 2014. The VGP was valid until 19 December 2018, and has been extended since the Vessel Incidental Discharge Act was developed.

The Vessel Incidental Discharge Act (VIDA) was signed into law on 4 December 2018. This act establishes new framework for the regulation of vessel incidental discharges under the Clean Water Act. VIDA requires the EPA to develop performance standards for discharges within two years of enactment, and requires the USCG to develop implementation, compliance, and enforcement regulations within two years of the EPA's promulgated standards.

Under VIDA, all VGPs remain in force until the USCG regulations are finalized. The AMHS fleet must continue to operate according to their VGP. Once the USCG regulations are finalized, AMHS will be required to review their operations to adhere to these new regulations. EPA released their proposed rule in the Federal Register on October 26, 2020, and USCG regulations are due in late 2022.

A.2.2 Air Emissions

Diesel Engine Exhaust

The EPA has adopted air emission requirements for marine diesel engines. The current requirements are commonly referred to as EPA Tier 3 and Tier 4. Tier 4 is the most stringent requirement and applies to all new diesel engines above 600 kW output. To meet Tier 4, exhaust aftertreatment systems are usually required. Tier 3 is allowed for new engines below 600 kW output and under approved hardship conditions for engines above 600 kW. Tier 3 requirements can be met with "on engine" technologies. For repowers, EPA will allow Tier 3 engines, if vessel operators are able to show it is impractical to install the exhaust after treatment systems necessary for compliance with Tier 4. EPA granted a Tier 4 exemption for the repower of the *Matanuska* (i.e., allowed Tier 3 engines to be installed). Such an exemption will be necessary each time a repower is planned.

Other Greenhouse Gases

The EPA continues to identify, regulate, and ban the production of ozone-depleting compounds and greenhouse gases (GHGs) under Title VI of the Clean Air Act. This includes refrigerants and fire extinguishing agents used throughout the AMHS fleet in both refrigeration, air conditioning and fire extinguishing applications. Among the newer hydrofluorocarbon (HFC) and HFC-blend refrigerants affected by the regulations are several that are prevalent in the AMHS fleet: R-404A, R-134a, and R-410A and R-407C, used to replace R-22. Under the rules, new chillers and condensing plants would no longer be produced using these refrigerants after Jan. 1, 2024.

AMHS will be allowed to continue operating existing machinery utilizing these compounds, however, costs are expected to increase and the availability of the compounds to decrease. New equipment purchased after January 1, 2024, will likely be incompatible with existing equipment. AMHS will require spares of multiple compounds and equipment.

Production of Halon 1301, used for the Engine Room fire extinguishing systems on *LeConte* and *Aurora* has been regulated by the EPA for many years. Halon 1301 will become increasingly difficult to source, and these systems will continue to get increasingly difficult to support.

A.3 Americans with Disabilities Act (ADA) Compliance

AMHS has made a significant investment to make their vessels ADA compliant. Facilities such as passenger elevators, dedicated ADA staterooms, and other dedicated public access areas such as cafeterias, lounges, restrooms, etc., demonstrate AMHS's to provide for people with disabilities.

A.4 Alaska Department of Environmental Conservation (ADEC)

ADEC published a Commercial Passenger Vessel Environmental Compliance Program that stipulates recording and sampling of discharged treated sewage under Alaska statutes. The program is intended to monitor cruise ships and large vessels, and it specifies less stringent regulations for small passenger vessels. AMHS voluntarily complied with these regulations and obtained discharge permits for five mainliners in the fleet (*Columbia*, *Kennicott*, *Matanuska*, and the retired *Malaspina* and *Taku*) under the small commercial vessel requirements.

A.5 International Maritime Organization (IMO)

IMO certification is required for vessels sailing on international voyages. Sailing between Ketchikan and Prince Rupert, BC, Canada qualifies as an international voyage and so requires AMHS to use an IMO certified vessel for operating on this route. AMHS has two vessels with the IMO certification necessary for international voyages: *Kennicott* and *Matanuska*. This section only applies to those two ships.

IMO is very proactive in implementing new regulations for safety and environmental protection. Many of these regulatory changes are retroactively applied to existing ships. AMHS should continue to actively monitor and track pending regulatory changes on the IMO front.

A.5.1 Safety of Life at Sea (SOLAS)

Compliance with the SOLAS requirements is one aspect of IMO certification. Only *Kennicott* meets current SOLAS requirements. There is an outstanding list of modifications identified for *Matanuska* to maintain SOLAS certification, foremost among these modifications is the elimination of dead-end corridors on the Cabin Deck.

A.5.2 International Convention for the Prevention of Pollution from Ships (MARPOL) Annex IV

Changes to MARPOL Annex IV have been approved for Annex 22. Resolution MEPC.227(64) was adopted on 5 October 2012 and went into force on 1 January 2016. The rule sets new effluent standards for shipboard sewage treatment systems. The new standards do not allow the use of the type of MSD systems currently installed on AMHS vessels, which relies primarily on maceration, chlorination, and dilution. The rule will only apply to new systems and will not affect the current installation. However, if the system is replaced, for example with a system that uses fresh water as a medium, it will need to comply with the new effluent standard.

A.5.3 MARPOL Annex VI

IMO, through MARPOL Annex VI, has invoked new energy efficiency requirements for existing ships that entered into force in 2023, commonly referred to as EEXI (Energy Efficiency eXisting ship Index). *Kennicott* meets EEXI. *Matanuska* does not meet EEXI. AMHS is aware of and actively pursuing available options to get *Matanuska* in compliance.

IMO through MARPOL Annex VI has also implemented a Ship Energy Efficiency Management Plan (SEEMP). Part II of this plan requires determination of a ship's Carbon Intensity Index (CII). This requires AMHS to track and report fuel consumption and distance sailed among other things for both *Matanuska* and *Kennicott*. AMHS is aware of and actively implementing methodologies for tracking and reporting the necessary information for IMO.

Appendix B PCCI October 2022 Coatings Survey Report

Coatings Survey: M/V Matanuska

October 21, 2022

Submitted To:
Dan Pisegna
Project Manager
Vigor Alaska
3801Tongass Highway
Ketchikan, AK 99901

Completed By:

pcci
Protective Coating Consultants, Inc.

PCCI **Protective Coating Consultants Inc**
P.O. Box 84162· Seattle, WA 98124

October 21, 2022

Dan Pisegna
Project Manager
Vigor Alaska
3801 Tongass Highway
Ketchikan, AK 99901

Subject: Coatings Survey M/V Matanuska

Dear Dan,

On October 12-13, 2022, I conducted an inspection of the existing coatings in the tanks, double bottoms, voids, and other areas (both interior and exterior) of the M/V Matanuska while the vessel was in dry dock at Vigor Alaska in Ketchikan, AK. The following survey includes PCCI Survey Sheets with pictures documenting the existing coating conditions and general remarks concerning the various areas inspected.

Areas that are in need of attention in the near future include the following:

- No. 11 Port & Starboard Voids
- No. 4 Void
- No. 10 Port & Starboard Voids
- No. 10 Center Line Void

Pictures and descriptions of the corrosion taking place in these areas are included in the survey. Please note that the No. 4 and No. 5 Cofferdams were not open at the time of inspection. In addition, the V-2 and V-3 Sewage Tanks were being cleaned at the time of the inspection.

Thank you for the opportunity to provide this survey to Vigor Alaska. If you have any questions or comments, please do not hesitate to contact our office.

Sincerely,

Nathan Lubetkin
PCCI
NACE Coating Inspector
Level 2 – Certification No. 51508

Table of Contents

Forepeak ……1
No. 1 Deep Ballast…….3
No. 2 Double Bottom Ballast ……5
No. 3 Void ……7
No. 3 Port & Starboard Wing Ballasts & Center Line Double Bottom Ballast ……9
No. 4 Void ……...11
No. 4 Port & Starboard Wing Ballasts & Center Line Double Bottom Ballast …..14
No. 4 Transducer Void ……16
No. 5 Port & Starboard Voids, Wing Voids, & Double Bottom …….18
V-1 Sewage Tank …….....21
No. 8 Port & Starboard Wing Ballasts ……...23
No. 9 Port & Starboard Wing Voids ……..24
No. 9 Center Line Double Bottom Ballast ……26
No. 10 Port & Starboard Voids ……...28
No. 10 Center Line Void ……31
No. 11 Port & Starboard Voids ……...33
No. 11 Center Line Ballast ……36
Car Deck & Superstructure ……38
Freeboard……41
Underwater Hull ……..43

Forepeak

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal				Minor corrosion on skip welds in lower forward section.			
Marine Growth							
Dry Film Thickness							
Other							Concrete on deck in lowest section.

Existing Coating System: Unknown off white epoxy (see Photo 1).

Photo 1: Existing Coating System in the Forepeak

General Remarks: Overall, the coatings in the Forepeak remain in satisfactory condition. There is some minor corrosion on the skip welds and sharp edges in the lower forward section (see Photo 2).

Photo 2: Minor Corrosion on Skip Welds & Sharp Edges in Lower Forward Section

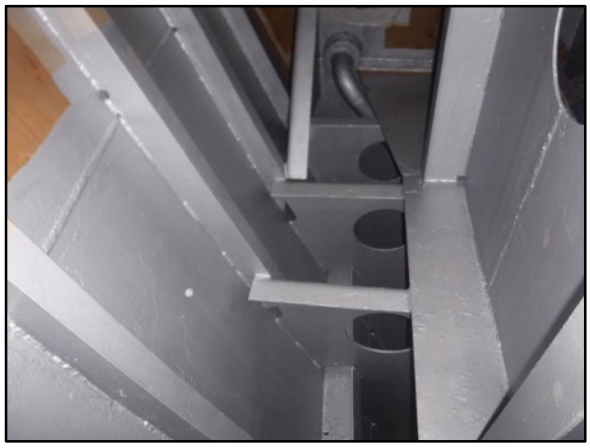
Recommendations for Future: No touch up is currently needed. Continue to inspect the Forepeak on an annual basis with special attention the welds in the forward section.

No. 1 Deep Ballast

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal	Minor corrosion on welds in port side upper section, near aft bulkhead.		Corrosion on aft bulkhead, near ladder.	Minor corrosion on forward bulkhead.			
Marine Growth							
Dry Film Thickness							
Other							

Existing Coating System: Unknown gray coating. The welds and the entire lower section have been touched up with what appears to be Intershield 300 (see Photos 3 and 4).

Photos 3 & 4: Existing Coating System in No. 1 Deep Ballast



General Remarks: There is corrosion on the forward bulkhead on the starboard side (see Photo 5) and on the aft bulkhead, under the aft ladder (see Photo 6). In addition, there is minor corrosion on welds in the port side upper section, near the aft bulkhead (see Photo 7). Coatings in the remainder of the void remain in satisfactory condition.

Photo 5: Corrosion on Forward Bulkhead

Photo 6: Corrosion on Aft Bulkhead

Photo 7: Minor Corrosion on Welds in Upper Section

Recommendations for Future: No touch up currently needed. The corrosion areas on the forward and aft bulkheads will most likely need to be touched up in the next 1-2 years. Continue to inspect the No. 1 Deep Ballast on an annual basis.

No. 2 Double Bottom Ballast

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal							
Marine Growth							
Dry Film Thickness							
Other	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.

Existing Coating System: Appears to be a bitumastic coal tar epoxy underneath the dirt and mud (see Photo 8).

Photo 8: Mud Caked on Walls of No. 2 Double Bottom

General Remarks: The No. 2 Double Bottom Ballast is extremely dirty and caked in mud, so it is difficult to assess the condition of the coatings. The coatings appear to remain intact underneath the mud.

Recommendations for Future: No touch up currently needed. We recommend cleaning the No. 2 Double Bottom Ballast in the future so that a better assessment of the coatings can be completed.

No. 3 Void

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal							Corrosion on the deck near forward and aft bulkheads.
Marine Growth							
Dry Film Thickness							
Other							

Existing Coating System: Unknown red coating (see Photo 9). Areas have been touched up with what appears to be Intershield 300 epoxy.

Photo 9: Existing Coating System in No. 3 Void

General Remarks: There is corrosion on the deck of the void near the forward and aft bulkheads, (see Photos 10 and 11). Coatings in the remainder of the void remain in satisfactory condition.

Photo 10: Corrosion on Deck near Forward Bulkhead

Photo 11: Corrosion on Deck near Aft Bulkhead

Recommendations for Future: No touch up currently needed. The corrosion on the deck near the forward and aft bulkheads will most likely need to be touched up in the next 1-2 years. Continue to inspect the No. 3 Void on an annual basis.

No. 3 Port & Starboard Wing Ballasts & No. 3 Center Line Double Bottom Ballast

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal							
Marine Growth							
Dry Film Thickness							
Other	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.

Existing Coating System: Appears to be a bitumastic coal tar epoxy coating underneath the dirt and mud (see Photos 12-14).

Photo 12: Port Wing Ballast

Photo 13: Starboard Wing Ballast

Photo 14: No. 3 Center Line DB Ballast

General Remarks: The No. 3 Wing Ballasts and Center Line Double Bottom Ballast are extremely dirty and caked in mud. However, the coatings appear to remain intact underneath.

Recommendations for Future: No touch up currently needed. We recommend cleaning the No. 3 Wing Ballasts and No. 3 Center Line Double Bottom Ballast in the future so that a better assessment of the coatings can be completed. Continue to inspect on an annual basis.

No. 4 Void

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal		Corrosion on welds above starboard wing ballast near aft bulkhead.					Corrosion on walls of pipe alley. Corrosion on deck near forward & aft bulkheads.
Marine Growth							
Dry Film Thickness							
Other							

Existing Coating System: Unknown red coating. Touch up has been done with what appears to be Intershield 300 (see Photo 15).

Photo 15: Existing Coating System in No. 4 Void

General Remarks: There is corrosion on welds and the skin plate on the starboard side above the wing ballast, mostly near the aft bulkhead (see Photos 16 and 17). There is also corrosion on the sides of the pipe alley (see Photo 18). Finally, there is corrosion on the deck near the forward and aft bulkheads (see Photo 19) The coatings in the remainder of the void remain in satisfactory condition.

Photos 16 & 17: Corrosion on Skin Plate Above Starboard Wing Ballast

Photo 18: Corrosion on Sides of Pipe Alley

Photo 19: Corrosion on Deck Near Forward Bulkhead

Recommendations for Future: At next availability, we recommend power tool cleaning (as per SSPC-SP 15) the corrosion areas on the welds and skin plate above the starboard wing ballast and applying 2 coats and a stripe coat of Intershield 300 epoxy. We also recommend power tool cleaning the walls of the pipe alley and coating with 2 coats of Intershield 300. This area is difficult to access, so if power tool cleaning is not possible, Interbond 600 could be used to seal up the corrosion areas. The corrosion on the deck, near the forward and aft bulkheads, will also most likely need to be touched up in the next 1-2 years. Continue to inspect the No. 4 Void on an annual basis.

No. 4 Port & Starboard Wing Ballasts & No. 4 Center Line Double Bottom Ballast

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal							
Marine Growth							
Dry Film Thickness							
Other		Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud. Water on deck in Center Line DB Ballast.

Existing Coating System: Appears to be bitumastic coal tar coating underneath dirt and mud (see Photos 20-22).

Photo 20: No. 4 Port Wing Ballast

Photo 21: No. 4 Starboard Wing Ballast

Photo 22: No. 4 Center Line Double Bottom Ballast

General Remarks: The No. 4 Port Wing Ballast is not as dirty as the others, which are coated in dirt and mud. The coatings appear to remain intact underneath the mud.

Recommendations for Future: We recommend cleaning the No. 4 Wing Ballasts and No. 4 Double Bottom Ballast in the future so that a better assessment of the coatings can be completed. Continue to inspect on an annual basis.

No. 4 Transducer Void

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal							Dirty on deck of Transducer Void.
Marine Growth							
Dry Film Thickness							
Other							

Existing Coating System: The No. 4 Transducer Void is coated in an unknown red coating (see Photo 23).

Photo 23: Existing Coating System in No. 4 Transducer Void

General Remarks: The deck of the Transducer Void is dirty, but the coatings remain in satisfactory condition.

Recommendations for Future: No touch up is currently needed. Continue to inspect the No. 4 Transducer Void on an annual basis.

No. 5 Port & Starboard Voids, Wing Voids, & Double Bottom

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal		Corrosion on deck, near center line bulkhead and Corrosion on deck near aft bulkhead.					Minor Corrosion on welds on deck of Double Bottom
Marine Growth							
Dry Film Thickness							
Other					Insulation on overheads of No. 5 Voids.		

Existing Coating System: The No. 5 Voids, Wing Voids, and Double Bottom are coated in what appears to be a bitumastic coal tar epoxy system (see Photos 24 and 25). The overhead of the No. 5 Voids is covered with an insulating material.

Photo 24: No. 5 Port Void

Photo 25: No. 5 Starboard Void

General Remarks: There is corrosion on the deck of the No. 5 Starboard Void, near the center line bulkhead (see Photo 26). The coatings in the Wing Voids remains in satisfactory condition (see Photos 27 and 28). In the No. 5 Double Bottom, there is minor corrosion on the welds on the deck (see Photo 29).

Photo 26: Corrosion near Centerline Bulkhead in No. 5 Starboard Void

Photo 27: No. 5 Port Wing Void

Photo 28: No. 5 Starboard Wing Void

Photo 29: Minor Corrosion on Welds on Deck of No. 5 Double Bottom

Recommendations for Future: No touch up currently needed. The deck of the No. 5 Starboard Void, near the center line bulkhead, should be touched up in the next 1-2 years. The welds on the deck of the No. 5 Double Bottom will also most likely need to be touched up in the next 2-3 years. Continue to inspect the No. 5 Voids, Wing Voids, and Double Bottom on an annual basis.

V-1 Sewage Tanks

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							2 small delam spots on the deck.
Blisters							
Corrosion/ Bare Metal							
Marine Growth							
Dry Film Thickness							
Other							

Existing Coating System: The V-1 Sewage tank is coated in an unknown off white epoxy system (see Photo 30). There are multiple areas where touch up has been done over the years.

Photo 30: Existing Coatings in V-1 Sewage Tank

General Remarks: Overall, the coatings in the V-1 Sewage Tank remains in satisfactory condition. There are two small delamination spots on welds on the deck of the of the tank (see Photo 31).

Photo 31: Delamination Spots on Deck of V-2 Sewage Tank

Recommendations for Future: No touch up and repair currently needed. The delamination spots on the deck of the V-1 Sewage Tank will most likely need to be touched up in the next 1-2 years. Continue to inspect the Sewage Tanks on an annual basis.

No. 8 Port and Starboard Wing Ballasts

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal							
Marine Growth							
Dry Film Thickness							
Other	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.

Existing Coating System: Appears to be a bitumastic coal coating underneath dirt and mud (see Photos 32 and 33).

Photo 32: No. 8 Port Wing Ballast

Photo 33: No. 8 Starboard Wing Ballast

General Remarks: Both Wing Ballasts are coated in mud. Underneath the mud, the coatings appear to remain intact.

Recommendations for Future: No touch up currently needed. We recommend cleaning the No. 8 Wing Ballasts in the future, so that a better assessment of the coatings can be completed. Continue to inspect the No. 8 Port and Starboard Wing Ballasts on an annual basis.

No. 9 Port & Starboard Wing Voids

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal							
Marine Growth							
Dry Film Thickness							
Other	Very dirty in port wing void.	Very dirty in starboard wing void.					

Existing Coating System: The existing coating appears to be a red epoxy system, but it is very difficult to see underneath the dirt and mud (see Photos 34 & 35).

Photo 34: No. 9 Port Wing Void

Photo 35: No. 9 Starboard Wing Void

General Remarks: Both wing voids are very dirty, but coating appears to remain intact underneath.

Recommendations for Future: No touch up is currently needed. We recommend cleaning the No. 9 Wing Voids in the future, so that a better assessment of the coatings can be completed. Continue to inspect the No. 9 Port and Starboard Wing Voids on an annual basis.

No. 9 Center Line Double Bottom Ballast

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination	Coating delam spots.	Coating delam spots.					
Blisters							
Corrosion/ Bare Metal							
Marine Growth							
Dry Film Thickness							
Other	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud.	Coated in mud. Bricks for ballast.

Existing Coating System: Appears to be a bitumastic coal tar underneath dirt and mud (see Photo 36).

Photo 36: Existing Coating System in No. 9 Double Bottom Ballast

General Remarks: The No. 9 Double Bottom Ballast is extremely dirty and caked with mud. There are spots throughout the double bottom where the coating appears to be delaminating (see Photo 37). In order to get a good look at the condition of the coating, these areas would need to be cleaned.

Photo 37: Coating Delamination Spots

Recommendations for Future: We recommend cleaning the No. 9 Double Bottom Ballast in the near future, so that a better assessment of the coatings can be completed. Continue to inspect on an annual basis.

No. 10 Port & Starboard Voids

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination		Delam spot in lower middle section of starboard void.					
Blisters							
Corrosion/ Bare Metal	Corrosion in lower section of port void.	Corrosion on in lower section of starboard void.					Corrosion & delam spots on deck of Cross Flood.
Marine Growth							
Dry Film Thickness							
Other							

Existing Coating System: Appears to be a red epoxy system with Inteshield 300 touch up in lower sections of both voids (see Photos 38 and 39).

Photo 38: No. 10 Port Void

Photo 39: No. 10 Starboard Void

General Remarks: There is corrosion and delamination spots on the deck of the Cross Flood (see Photo 40). In addition, there is corrosion on the deck in the lower section of both voids, mostly near the forward bulkheads (see Photo 41). There is also a delamination spot in the lower

middle section of the No. 10 Starboard Void (see Photo 42). Otherwise, the coatings remain in satisfactory condition.

Photo 40: Corrosion & Delamination Spots on Deck of Cross Flood

Photo 41: Minor Corrosion in Lower Section of No. 10 Port Void

Photo 42: Delamination Spot in Middle Lower Section of No. 10 Starboard Void

Recommendations for Future: At the next availability, we recommend power cleaning (as per SSPC-SP 15) the corrosion areas on the deck of Cross Flood and corrosion/delamination spots in the lower section of the No. 10 Port and Starboard Voids. We then recommend that these areas be coated with two coats and a stripe coat of Intershield 300. Continue to inspect the No. 10 Port and Starboard Voids on an annual basis.

No. 10 Center Line Void

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							Delam spots and corrosion on deck in middle section of the void.
Blisters							
Corrosion/ Bare Metal							Corrosion on deck of Cross Flood in forward section.
Marine Growth							
Dry Film Thickness							
Other							

Existing Coating System: Unknown red epoxy system. The lower section has been touched up with what appears to be Inteshield 300 (see Photo 43).

Photo 43: No. 10 Center Line Void

General Remarks: There are coating delamination spots and corrosion on the deck in the middle section (see Photo 44). There is also minor corrosion on the deck of the Cross Flood in

the forward section of the void (see Photo 45). Otherwise, the coatings in the void remain in satisfactory condition.

Photo 44: Coating Delamination Spots & Corrosion on Deck in Middle Section

Photo 45: Corrosion on Deck of Cross Flood

Recommendations for Future: At the next availability, we recommend power tool cleaning (as per SSPC-SP 15) the corrosion/delamination areas on the deck in the middle section and corrosion areas on the deck of the Cross Flood in the forward section. The recommended coating system in these areas would be two coats and a stripe coat of of Intershield 300. Continue to inspect the No. 10 Center Line Void on an annual basis.

No. 11 Port & Starboard Voids

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal	Corrosion on skin plate in forward section above 300 touch up.	Corrosion on skin plate in forward section.	Corrosion on deck in aft section of both voids.				Corrosion on deck of Cross Flood.
Marine Growth							
Dry Film Thickness							
Other							

Existing Coating System: Unknown red and light blue coating. Touch up has been done with what appears to be Intershield 300 in the lower forward sections of both voids (see Photos 46 and 47).

Photo 46: No. 11 Port Void

Photo 47: No. 11 Starboard Void

General Remarks: There is corrosion on the welds of the skin plate in both voids, above the touch up areas in the forward sections (see Photos 48 and 49). In addition, there is corrosion in the lowest section of both voids, in the middle and aft sections (see Photos 50 and 51). Finally, there is corrosion on the deck of the Cross Flood (see Photo 52).

Photos 48 & 49: Corrosion on Skin Plate in Forward Section of Both Voids

Photo 50: Corrosion in Lower Aft Section of No. 10 Port Void

Photo 51: Corrosion in Lower Middle Section of No. 11 Starboard Void

Photo 52: Corrosion on Deck of Cross Flood

Recommendations for Future: At next availability, we recommend power tool cleaning (as per SSPC-SP 15) corrosion areas on the skin plate in the forward section of the No. 11 Port & Starboard Voids and coating with two coats and a stripe coat of Intershield 300 epoxy. We also recommend that corrosion areas in the lower aft and middle sections of both voids, near the center line bulkhead, and corrosion areas on the deck of the Cross Flood be power tool cleaned (as per SSPC-SP 15) and touched up with two coats and a stripe coat of Intershield 300 at the next availability. Continue to inspect the No. 11 Port and Starboard Voids on an annual basis.

No. 11 Center Line Ballast

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal	Minor corrosion on skip welds.	Minor corrosion on skip welds.				Minor corrosion on welds on forward and aft bulkheads.	Minor Corrosion on welds on deck.
Marine Growth							
Dry Film Thickness							
Other							

Existing Coating System: Unknown off white epoxy. Touch up has been done with what appears to be Intershield 300 epoxy (see Photo 53).

Photo 53: Existing Coating System in No. 11 Center Line Ballast

General Remarks: Overall, the coatings in the No. 11 Center Line Ballast remain in satisfactory condition. It is dirty on the deck and there is some minor corrosion on skip welds in the lower section (see Photo 54).

Photo 54: Minor Corrosion on Welds in Lower Section

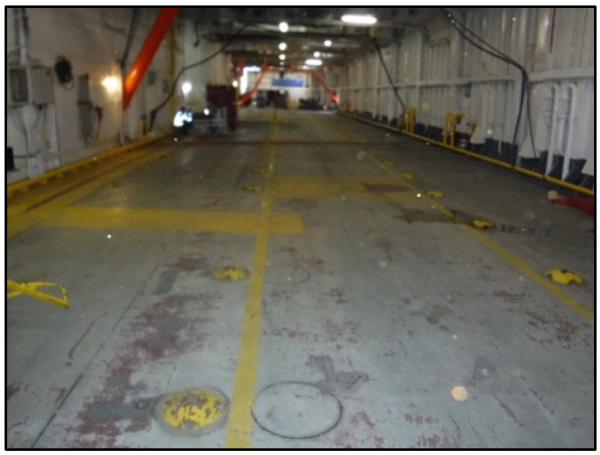
Recommendations for Future: No touch up currently needed. Continue to inspect the No. 11 Center Line Ballast on an annual basis with special attention on the welds in the lower section.

Car Deck & Superstructure

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal	Minor corrosion on handrails of Superstructure.	Minor corrosion on handrails of Superstructure.					
Marine Growth							
Dry Film Thickness							
Other							

Existing Coating System: The Car Deck was most likely originally coated in Interzinc 52 zinc rich epoxy. It appears that touch up has been done over the years with Interlac 665 alkyd enamel (see Photos 55 and 56). The Superstructure and Superstructure Decks were originally topcoated with Interthane 990. They are maintained by the crew using Corroseal and Interlac 665 alkyd enamel.

Photos 55 & 56: Car Deck



General Remarks: Coatings have worn down on many areas of the Car Deck. The coatings on the superstructure have been well maintained by the crew (see Photos 57-60). As is common,

there are some minor corrosion spots on handrails (see Photo 61) and around door/window frames on the Superstructure.

Photo 57: Stack

Photo 58: Solarium

Photo 59: Lower Aft Deck

Photo 60: Focsle Deck

Photo 61: Corrosion on Handrail

Recommendations for Future: No touch up currently needed. Crew should continue to maintain areas on the Car Deck and Superstructure.

Freeboard

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination							
Blisters							
Corrosion/ Bare Metal	Corrosion on rub rail and around the anchor.	Corrosion on rub rail and around the anchor.					
Marine Growth							
Dry Film Thickness							
Other	Rust bleeding below vents.	Rust bleeding below vents.					

Existing Coating System: The original system on the freeboard was a zinc rich epoxy primer, epoxy intermediate, and polyurethane topcoat (Interzinc 52, Intershield 300, and Interthane 990) (see Photos 62 and 63).

Photo 62: Port Side Freeboard

Photo 63: Starboard Side Freeboard

General Remarks: The coatings on the rub rails have worn down and there is some minor corrosion (see Photo 64). As is common, there is some rust bleeding under the vents and drains (see Photo 65), and corrosion spots around the anchors. Otherwise, the coatings on the freeboard remain in satisfactory condition.

Photo 64: Corrosion on Rub Rails

Photo 65: Rust Bleed Under Vents & Drains

Recommendations for Future: No touch up currently needed. The rub rails will most likely need to be touched up in the next 1-2 years. Continue to inspect the Freeboard on an annual basis.

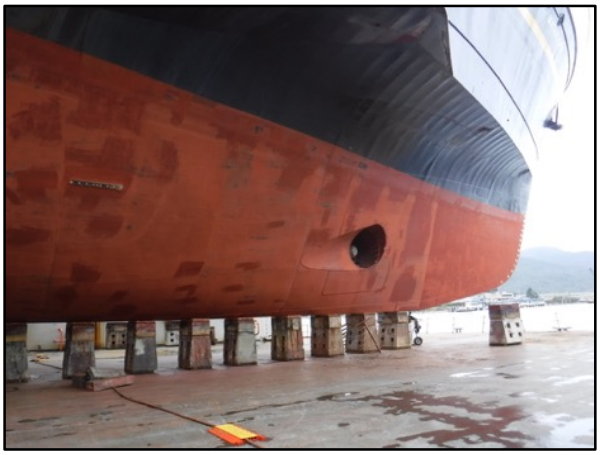
Underwater Hull

Conditions	Port	Starboard	Aft	Forward	Overhead	Bulkhead	Deck
Mechanical Damage							
Cracking							
Peeling/ Delamination			AF delam spots near stern & on rudders.				
Blisters							
Corrosion/ Bare Metal							
Marine Growth							
Dry Film Thickness							
Other	Black AF showing through on less than 5%.	Black AF showing through on less than 5%.					

Existing Coating System: Appears to be two coats of epoxy and two coats of Antifouling (most likely Intershield 300 epoxy and Interspeed 640 AF). The top coat of AF is red (see Photos 66 and 67).

Photo 66: Port Side Underwater Hull

Photo 67: Starboard Side Underwater Hull



General Remarks: Overall, the coatings on the Underwater Hull remain in satisfactory condition. The Black AF is showing through on less than 5 percent of the total area. There are

small AF delamination spots on the flat of the bottom, near the stern (see Photo 68) and on the rudders (see Photo 69).

Photo 68: AF Delamination Spots Near Stern

Photo 69: AF Delamination Spots on Rudders

Recommendations for Future: At the next availability, we recommend that AF delamination areas are power tool cleaned as per SSPC-SP 3 and coated with one spot coat of Interhield 300 epoxy and two spot coat of Interspeed 640 AF. Continue to inspect the Underwater Hull on an annual basis.

Appendix C Menezil Engineering September 2022 Infrared Thermography Inspection Report

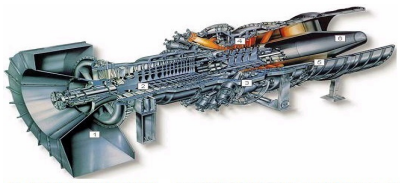
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

ALASKA MARINE HIGHWAY SYSTEM DEPT. OF TRANSPORTATION AND PUBLIC FACILITIES

AMHS M/V MATANUSKA

INFRARED THERMAL IMAGING SURVEY

SEPTEMBER 2022



MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

9/2/2022

Tom Carey
Port Engineer,
Alaska Marine Highways Marine Engineering Facility,
7037 North Tongass Hwy
Ketchikan Alaska, 99901

Re: 2022 Infrared Thermography Inspection Report

Per request of Alaska Marine Highway System, Menezil Engineering has performed Predictive Maintenance Services, visual and Infrared Thermography inspection on the M/V Matanuska Vessel electrical equipment that includes but not limited to electrical panels, MCC, Breakers, and Generators. A list of all equipment inspected is listed below. FLIR ThermaCAM P65 Series Infrared Camera was used to inspect and scan the electrical equipment.

During the inspection eight (8) electrical equipment had identified to be overheated “Hot Spot;” The overheated could be associated to dirt, looseness, and load balance or device failure. The identified overheated equipment need to be addressed as soon as soon possible. For more information and details on the “Hot Spot” see the details report below.

Menezil Engineering staff sincerely appreciates the opportunity Alaska Marine Highway System gave to Menezil Engineering to support its prediction maintenance program. In the event Alaska Marine Highway System needs additional information on this report, please do not hesitate to contact us.

Regards,

Ben. M
Electrical Engineer
Field Inspection manager
Menezil Engineering
786-382-4967
www.menezil.com

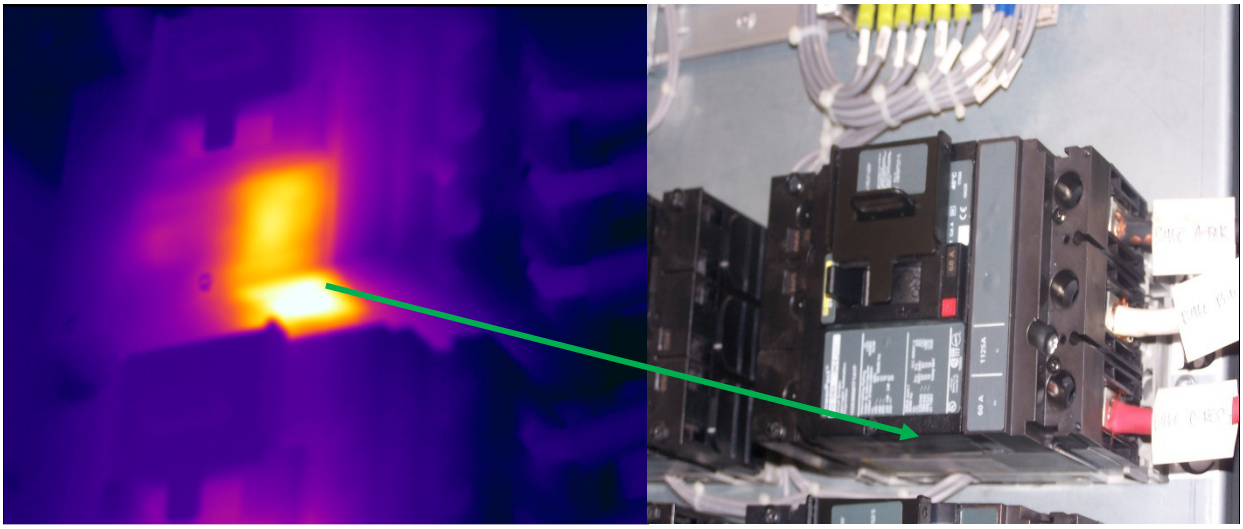
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Alaska Marine Highway System

M/V Matanuska

Infrared Thermography Inspection

Date: 8/31/2022



Vessel Name	M/V Matanuska
Location	Port Main Engine- 480V Distribution Panel
Equipment Name	Breaker- P-460 Vent- MCC-6 150 AF/ 60V AT
Problem:	Breaker is overheated internally
Recommendation:	Replace breaker.
Fault Classification	Severe

Object Parameter	**Value**
Atmospheric Temperature	85°F
Object Temperature	179 °F
Equipment Label	**Value**
IR: Date Of Creation	8/31/2022
IR: Time Of Creation	1:43 PM
IR: Max	1500 °F

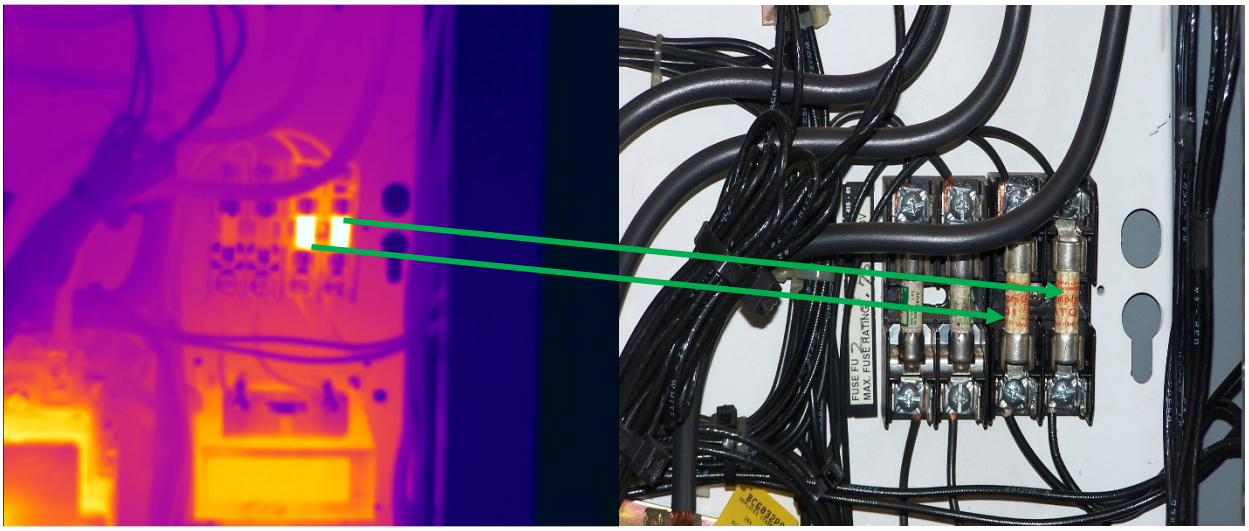
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Alaska Marine Highway System

M/V Matanuska

Infrared Thermography Inspection

Date: 8/31/2022



Vessel Name	M/V Matanuska
Location	Fidley Room
Equipment Name	Compressor Unit #2
Problem:	(Upper Right) First 2 fuses from the right are overheated
Recommendation:	Replace fuses, if possible replace the first two fuses from the right with higher amperage.
Fault Classification	Severe

Object Parameter	**Value**
Atmospheric Temperature	89°F
Object Temperature	197 and 195 °F respectively
Equipment Label	**Value**
IR: Date Of Creation	8/31/2022
IR: Time Of Creation	3:42 PM
IR: Max	1500 °F

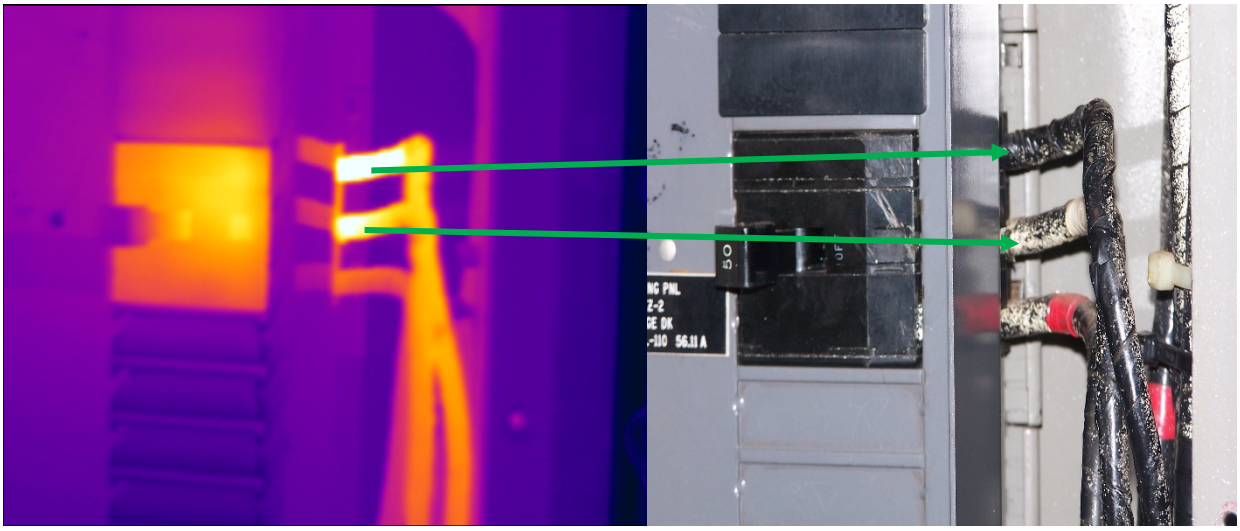
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Alaska Marine Highway System

M/V Matanuska

Infrared Thermography Inspection

Date: 8/31/2022



Vessel Name	M/V Matanuska
Location	Car deck 3- Forward Frame 61- Room FSD 14
Equipment Name	Lightning Panel MVZ-2 (EL-40A-4L-110) Breaker –wire terminals
Problem:	Wire terminals overheated
Recommendation:	Inspect the wire terminals for looseness dirt, and tightened.
Fault Classification	Medium

Object Parameter	**Value**
Atmospheric Temperature	83°F
Object Temperature	190 °F
Equipment Label	**Value**
IR: Date Of Creation	8/31/2022
IR: Time Of Creation	5:22 PM
IR: Max	1500 °F

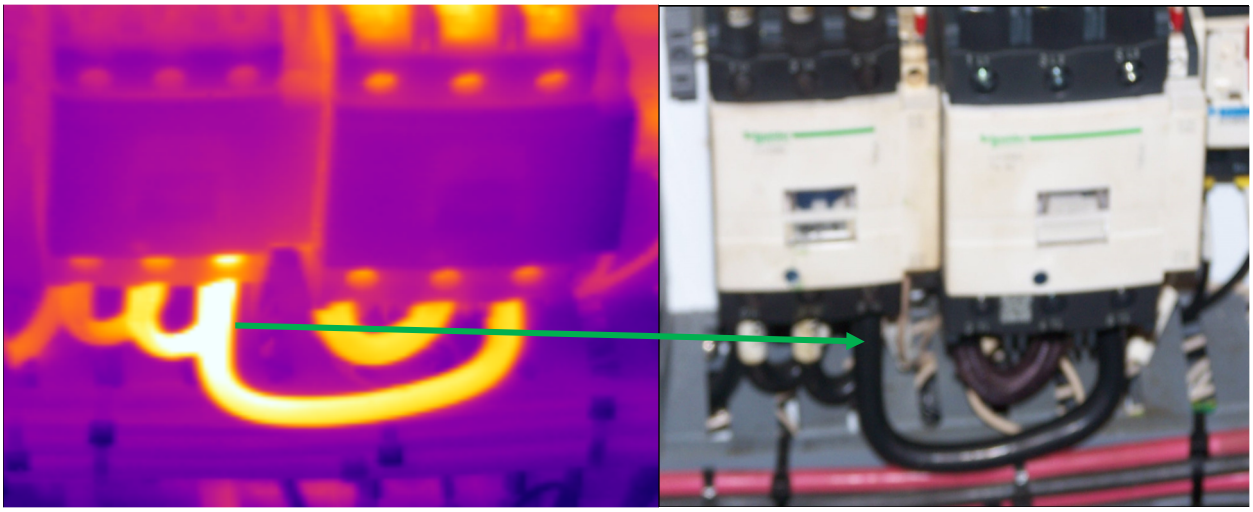
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Alaska Marine Highway System

M/V Matanuska

Infrared Thermography Inspection

Date: 9/1/2022



Vessel Name	M/V Matanuska
Location	MSD Room
Equipment Name	#3 MSD Control Panel- BC1 Bottom wire
Problem:	#3 MSD Control Panel- BC1 Bottom wire terminal 6T3 overheated.
Recommendation:	Inspect Book Contactor bottom wire terminals for corrosion and looseness, then tightened wire terminals.
Fault Classification	Severe

Object Parameter	**Value**
Atmospheric Temperature	80°F
Object Temperature	181 °F
Equipment Label	**Value**
IR: Date Of Creation	9/1/2022
IR: Time Of Creation	10:47 AM
IR: Max	1500 °F

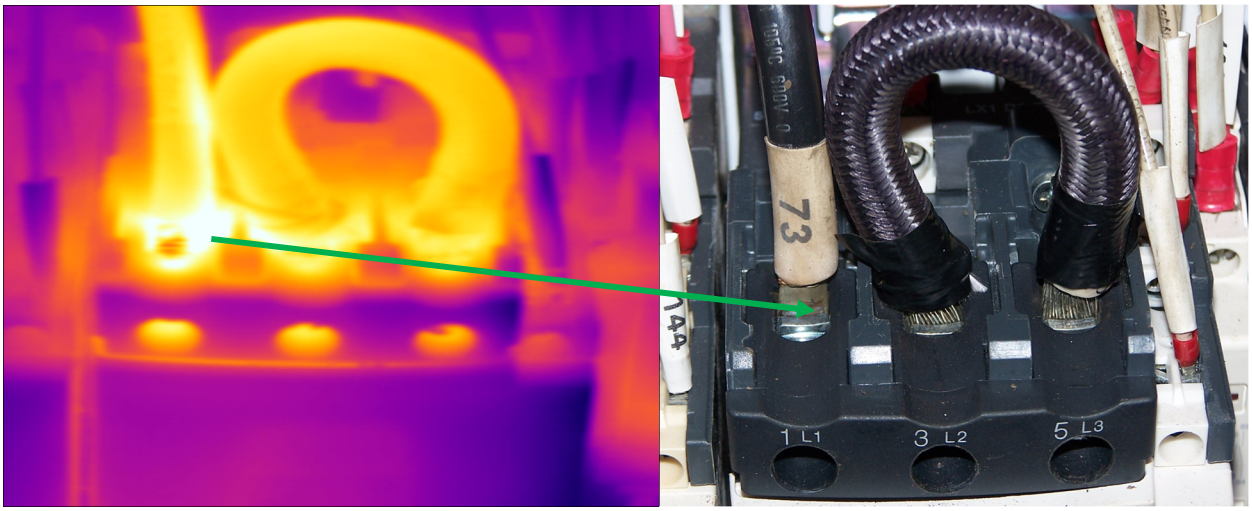
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Alaska Marine Highway System

M/V Matanuska

Infrared Thermography Inspection

Date: 9/1/2022



Vessel Name	M/V Matanuska
Location	MSD Room
Equipment Name	#2 MSD Control Panel Contactor Cell #2
Problem:	Top Schneider Book Contactor Cell #2 – wire terminal (#73) overheated.
Recommendation:	Inspect Book Contactor wire terminal for looseness, dirt, then tightened wire.
Fault Classification	Severe

Object Parameter	**Value**
Atmospheric Temperature	80°F
Object Temperature	203 °F
Equipment Label	**Value**
IR: Date Of Creation	9/1/2022
IR: Time Of Creation	10:53 AM
IR: Max	1500 °F

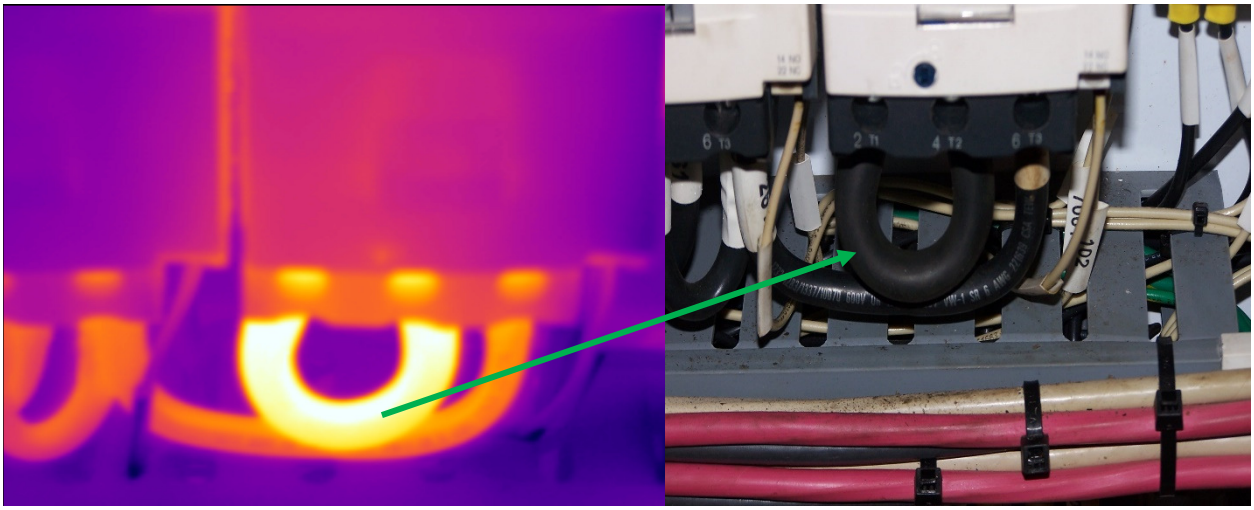
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Alaska Marine Highway System

M/V Matanuska

Infrared Thermography Inspection

Date: 9/1/2022



Vessel Name	M/V Matanuska
Location	MSD Room
Equipment Name	#2 MSD Control Panel Contactor Cell #2
Problem:	Bottom Schneider Book Contactor Cell #2 – Loop wire 2T1 to 4T2 overheated
Recommendation:	Inspect Book Contactor wire terminals for looseness, dirt, then tightened wire.
Fault Classification	Severe

Object Parameter	**Value**
Atmospheric Temperature	80°F
Object Temperature	190 °F
Equipment Label	**Value**
IR: Date Of Creation	9/1/2022
IR: Time Of Creation	10:57 AM
IR: Max	1500 °F

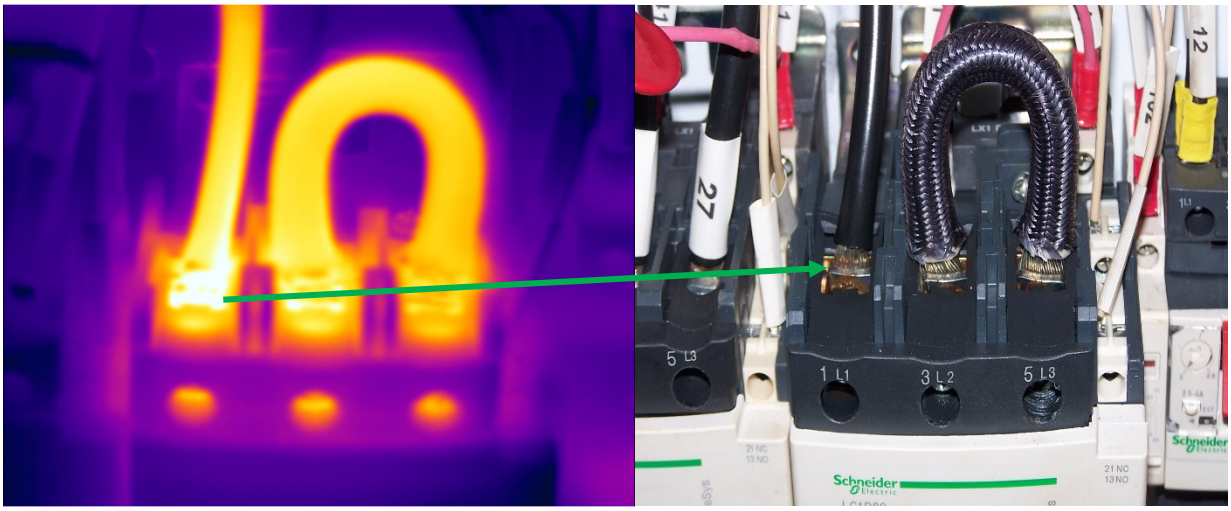
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Alaska Marine Highway System

M/V Matanuska

Infrared Thermography Inspection

Date: 9/1/2022



Vessel Name	M/V Matanuska
Location	MSD Room
Equipment Name	#1 MSD Control Panel
Problem:	Top Schneider Book Contactor Cell #1 – 1L1 Wire terminal overheated.
Recommendation:	Inspect Book Contactor wire for looseness, dirt, then tightened wire.
Fault Classification	Medium

Object Parameter	**Value**
Atmospheric Temperature	79°F
Object Temperature	174 °F
Equipment Label	**Value**
IR: Date Of Creation	9/1/2022
IR: Time Of Creation	11:00 AM
IR: Max	1500 °F

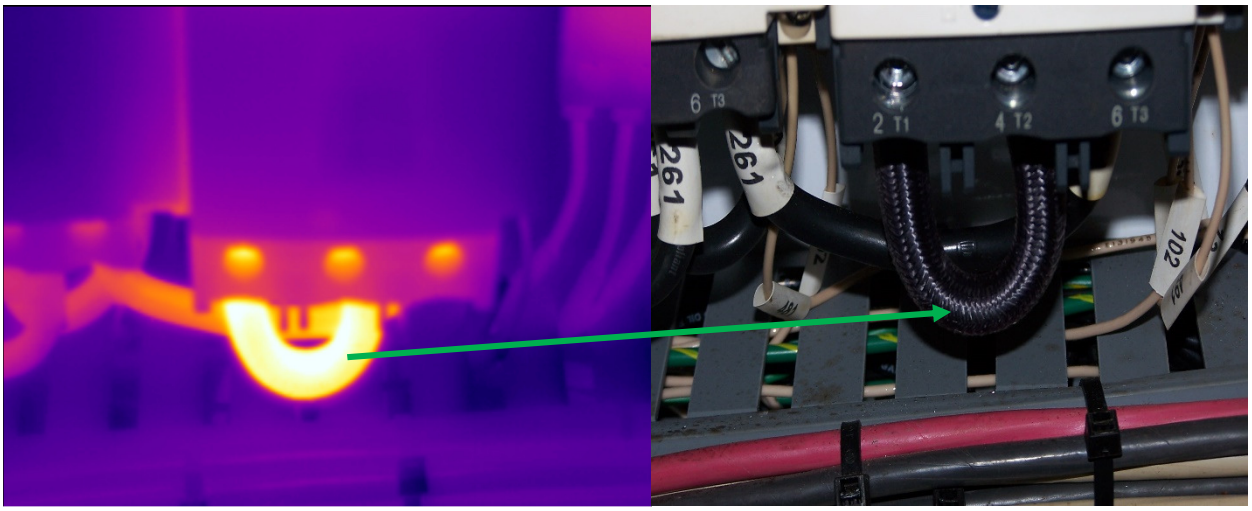
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Alaska Marine Highway System

M/V Matanuska

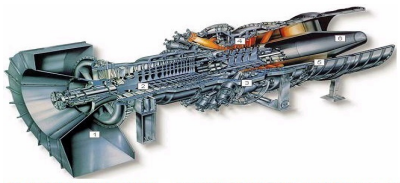
Infrared Thermography Inspection

Date: 9/1/2022



Vessel Name	M/V Matanuska
Location	MSD Room
Equipment Name	#1 MSD Control Panel
Problem:	Bottom Schneider Book Contactor Cell #1 – 2T1 to 4T2 Wire terminals overheated.
Recommendation:	Inspect Book Contactor wire for looseness, dirt, then tightened wire.
Fault Classification	Medium

Object Parameter	**Value**
Atmospheric Temperature	79°F
Object Temperature	177 °F
Equipment Label	**Value**
IR: Date Of Creation	9/1/2022
IR: Time Of Creation	11:09 AM
IR: Max	1500 °F



MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Matanuska - 2022

Engine Room Starboard MCC

#1 Exhaust Boiler Feed Pump 1P419	Engine Room Starboard MCC	Inspected
#2 Exhaust Boiler Feed Pump 2P419	Engine Room Starboard MCC	Inspected
#2 Fire and Sprinkling Pump 3P419	Engine Room Starboard MCC	Inspected
#1 Potable Water Pump 5P419	Engine Room Starboard MCC	Inspected
#2 Potable Water Pump 6P419	Engine Room Starboard MCC	Inspected
#1 Fire and Sprinkling Pump 7P419	Engine Room Starboard MCC	Inspected
#1 Aft Macerator Pump 12P419/Jacket Water	Engine Room Starboard MCC	Inspected
Starboard Engine Room Supply Fan 1P439	Engine Room Starboard MCC	Inspected
Port Engine Room Supply Fan 2P439	Engine Room Starboard MCC	Inspected
Aux Supply Fan 3P439	Engine Room Starboard MCC	Inspected

Engine Room- MCC-ER

Engine Room Exhaust Fan 5P439	Engine Room- MCC-ER	Inspected
Oil Fired LVP 4P439	Engine Room- MCC-ER	Inspected

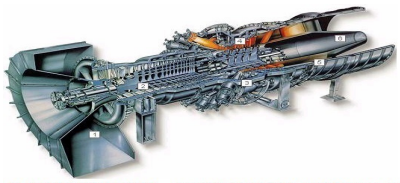
Engine Room Port MCC

Sewage Pump 6P418	Engine Room Port MCC	Inspected
ME JW Pump 12-P419	Engine Room Port MCC	Inspected
Fuel Oil Transfer Pump 8P418	Engine Room Port MCC	Inspected
#3 Air Compressor 14P418	Engine Room Port MCC	Inspected
Air Compressor #2 - 10P418	Engine Room Port MCC	Inspected
Sewage Pump 12P418	Engine Room Port MCC	Inspected
Lube Oil Purifier #1 1P418	Engine Room Port MCC	Inspected
Lube Oil Transfer Pump 2P418	Engine Room Port MCC	Inspected
Lube Oil Purifier #2 5P418	Engine Room Port MCC	Inspected

Bridge Deck

4L110 Lightning Panel	Bridge Deck	Inspected
5L0132 Lightning Panel	Bridge Deck	Inspected
18EL-102 Lightning Panel	Bridge Deck	Inspected

Back Recliner Lounge/Emergency Gear Locker



MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Panel EP6-102/Emergency Panel	Back Recliner Lounge/Emergency Gear Locker	Inspected
MCC7	Back Recliner Lounge/Emergency Gear Locker	Inspected
Recirc Exhaust 1P-461	Back Recliner Lounge/Emergency Gear Locker	Inspected
Recirc Supply 2P-461	Back Recliner Lounge/Emergency Gear Locker	Inspected

Fidley Room

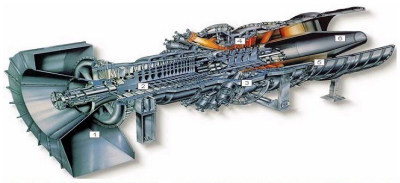
Power Panel P424	Fidley Room	Inspected
Compressor Unit 1	Fidley Room	N/A
Compressor Unit 2	Fidley Room	Inspected
Solarium 460 Panel	Fidley Room	Inspected
Sewage Tank Exhaust Panel	Fidley Room	Inspected
Breaker from Battery 24V	Fidley Room	Inspected
MCC8	Fidley Room	Inspected
Recirc LGE/Bor- 2P-463	Fidley Room	Inspected
Officer Quarters 3P-463	Fidley Room	Inspected
Exhaust Pass Toilet 4P-463	Fidley Room	Inspected
Officer Crew Dining 5P-463	Fidley Room	Inspected
Recirc Exhaust Fan 1P-463	Fidley Room	Inspected

Auxiliary Engine Room Gen. Main. Dist. Pnl

4EP401 Main Engine Local Control	Auxiliary Engine Room Gen. Main. Dist. Pnl	Inspected
ALC Compressor 2- 6P463	Auxiliary Engine Room Gen. Main. Dist. Pnl	Inspected
Main Engine Salt Water 5EP401	Auxiliary Engine Room Gen. Main. Dist. Pnl	Inspected

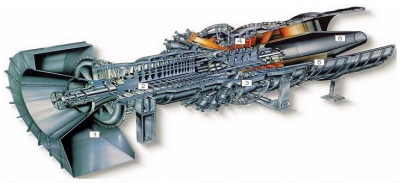
Emergency Generator Room

Fuel Oil Transfer Pump 2EP401	Emergency Generator Room	Inspected
Fuse Disconnect Switch	Emergency Generator Room	Inspected
Emergency Switchboard	Emergency Generator Room	Inspected
IC Distribution 120V- EP 106	Emergency Generator Room	Inspected
EP0401-400A Gen Circuit Breaker	Emergency Generator Room	Inspected



MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Engine Room Starboard		
Portable Water Pump 4P419	Engine Room Starboard	Inspected
Bilge Pimp 9P419	Engine Room Starboard	Inspected
Oil Water Transfer Pump 16P419	Engine Room Starboard	Inspected
vacuum Cleaner #2 15P419	Engine Room Starboard	N/A
Salt Water Service Pump 8P419 #2	Engine Room - MCC Starboard	Inspected
Sewage Pump #1 10P419	Engine Room Starboard	Inspected
STBD Engine Room Supply Fan 1-P439	Engine Room Starboard	Inspected
Engine Room Port		
Air Compressor #3 14P418	Engine Room Port	Inspected
Sewage Pump #3 12P418	Engine Room Port	Inspected
Upper Starboard AFT Main Engine Room		
MCC5	Upper Starboard AFT Main Engine Room	Inspected
Supply Fan Galley/Mess 2P-462	Upper Starboard AFT Main Engine Room	Inspected
#33 Exhaust Fan Galley 4P-462	Upper Starboard AFT Main Engine Room	Inspected
#36 Supply Fan Center Cabinet 1P-462	Upper Starboard AFT Main Engine Room	Inspected
#37 Exhaust Cabin DK Toilet 3P-462	Upper Starboard AFT Main Engine Room	Inspected
L-102 Deck 3 Stuck		
P443 Rolls Royce Power Panel	Upper Starboard AFT Main Engine Room	Inspected
Engine Room Shop		
LTG Feeder Panel L120-2nd Deck	Engine Room Shop	Inspected
4P-407 Jet Milling Machine	Engine Room Shop	Inspected
P407 Machine Shop Power Panel	Engine Room Shop	Inspected
Bow Thruster Area		
Bow Thruster Controllers	Bow Thruster Area	Inspected
Hydraulic Pump Controller	Bow Thruster Area	Inspected
Generator Room/Lower Level		
Boiler Control Panel	Generator Room	Inspected
Clean Lube Oil Pump Controller	Generator Room	Inspected
Auxiliary Room Generator Engine - MCC E		
Passenger Elevator Controller 3EP-401	Auxiliary Room Generator Engine - MCC E	Inspected

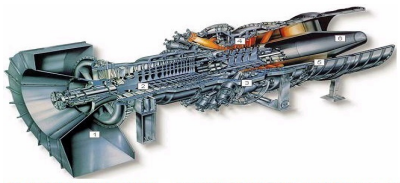


MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Service Elevator Controller 6EP-401	Auxiliary Room Generator Engine - MCC E	Inspected
Stern Tube Salt Water Pump 7EP-401	Auxiliary Room Generator Engine - MCC E	Inspected
Gen #3 & P419	Auxiliary Room Generator Engine	Inspected
Gen #2 & P418	Auxiliary Room Generator Engine	Inspected
Gen #1 & P401P0403 & P402	Auxiliary Room Generator Engine	Inspected
480V Distribution Section #1	Auxiliary Room Generator Engine	Inspected
480V Distribution Section #2	Auxiliary Room Generator Engine	Inspected
480V Distribution Section #3	Auxiliary Room Generator Engine	Inspected
120v Distribution Panel	Auxiliary Room Generator Engine	Inspected
P-408 Breaker Panel	Auxiliary Room Generator Engine	Inspected
LTG FDR Panel L132	Auxiliary Room Generator Engine	Inspected
P421 Refer Panel	Auxiliary Room Generator Engine	Inspected
Port Main Engine Sea Water Circ. Pump P451	Auxiliary Engine Room Gen	Inspected

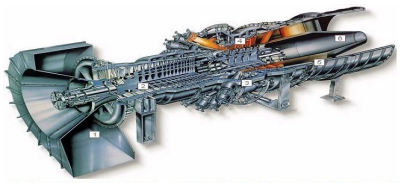
MSD Room

#1 MSD Control Panel	MSD Room	Inspected
#2 MSD Control Panel	MSD Room	Inspected
#3 MSD Control Panel	MSD Room	Inspected
Circuit P-412/EP-403	MSD Room	Inspected
MS Breaker Panel/P436	MSD Room	Inspected
#31 Sewage Tank Space Exhaust	MSD Room	Inspected
MCC2	MSD Room	Inspected
#20 Exhaust Fan Stew Quarters 2P-425	MSD Room	Inspected
319 Supply Fan Stew Quarters 3P425	MSD Room	Inspected
MCC1	MSD Room	Inspected
#18 Exhaust Fan Stew Quarters 2P458	MSD Room	Inspected
#17 Supply Fan Stew Quarters 3P458	MSD Room	Inspected
Sprinkler Pump	MSD Room	Inspected
Sewage Discharge Disconnect	MSD Room	Inspected
Macerator Recirc Pump Disconnect	MSD Room	Inspected
Draws 97 amps to 100 PSI	Shaft Alley	Inspected



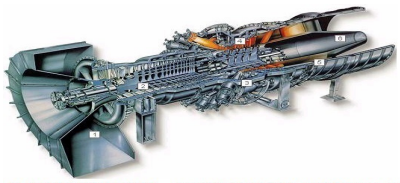
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Shaft Alley		
Cooling Pump P408 (1)	Shaft Alley	Inspected
Cooling Pump P408 (2)	Shaft Alley	Inspected
Bridge Deck		
Wheelhouse Emergency Lighting Panel 19EL102	Bridge Deck	Inspected
Main Deck Mid Zone Lighting Panel 16EL102	Frame 137 Port - Deck 3	Inspected
Car Deck		
Port Door Controller (Right)	Car Deck	Inspected
FWD Main Toilet Exhaust 242P-440	Car Deck	Inspected
Scullery Exhaust Fan #34/ 4P441	Car Deck	Inspected
Switchboard P477	Car Deck	Inspected
Boat Deck Exhaust #35 Bar Ex 12P-440	Car Deck	Inspected
STBD Door Controller (Left) P-409	Car Deck	Inspected
#6 AFT Cabin Deck Recic/Exhaust 3P441	Car Deck	Inspected
#22 Commissary Store Exhaust IP-441	Car Deck	Inspected
WT Door Breaker (by FSD #26-Grease Room)	Car Deck	Inspected
Breaker P-431 (Inside FSD #14)	Car Deck	Inspected
2L-132 Breaker Panel Emergency Locker	Car Deck	Inspected
4L-132 Breaker Panel Emergency Locker	Car Deck	Inspected
23 Exh Fan (Frm 27)- SP-441	Car Deck	Inspected
Refrigerated Fan Room - P-417	Car Deck	Inspected
5P441-SP442 Door Controller	Car Deck	Inspected
Kitchen/Galley		
Galley Panel P275	Kitchen/Galley	Inspected
Galley Panel 212 (1)	Kitchen/Galley	Inspected
Galley Panel 212 (3)	Kitchen/Galley	Inspected
Galley Panel 212 (5)	Kitchen/Galley	Inspected
Galley Panel 212 (2)	Kitchen/Galley	Inspected
Galley Panel 212 (4)	Kitchen/Galley	Inspected
Galley Panel 212 (6)	Kitchen/Galley	Inspected
Breaker Panel 212 (3)	Kitchen/Galley	Inspected
Breaker Panel 212 (4)	Kitchen/Galley	Inspected
Breaker Panel 212 (6)	Kitchen/Galley	Inspected
Breaker Panel 212 (5)	Kitchen/Galley	Inspected
Breaker Panel L-104	Kitchen/Galley	Inspected
Breaker Panel P-212 (1)	Kitchen/Galley	Inspected
Breaker Panel P-212 (2)	Kitchen/Galley	Inspected



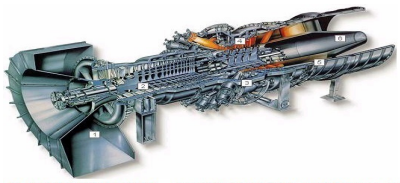
MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Storage Elevator		
Elevator Control System Breaker	Storage Elevator	Inspected
Starboard Boat Deck		
#3 Lift Boat Breaker Davit 1P-424-60A	Starboard Boat Deck	Inspected
Port Boat Deck		
Fast Rescue Boat Davit Breaker	Port Boat Deck	Inspected
Port- Life Boat Davit 2P424 60A	Port Boat Deck	
3L-110 Zone MVZ-2 Lightning Panel	Port Boat Deck	Inspected
Starboard Bridge Deck		
STBD- Life Boat Davit 2P424 60A	STBD Boat Deck	Inspected
Fast Rescue Boat Davit Breaker	Starboard Bridge Deck	Inspected
Starboard Cabin Deck- Passage Fan Room 8		
L-103 Lightning Panel	Starboard Cabin Deck-Passage Fan Room 8	Inspected
L-105 Lightning Panel	Starboard Cabin Deck-Passage Fan Room 9	Inspected
Cabin Deck- Cleaning Linen Locker		
MCC6	Cabin Deck- Cleaning Linen Locker	Inspected
#8 Exhaust Fan - AFT Cabin Deck 1P-460	Cabin Deck- Cleaning Linen Locker	Inspected
#7 Supply Fan Cafeteria 2P-460	Cabin Deck- Cleaning Linen Locker	Inspected
#5 Supply Fan Cabin Deck 3P-460	Cabin Deck- Cleaning Linen Locker	Inspected
STBD Passage Way - AFT Cabin 27		
Breaker Panel P441	STBD Passage Way - AFT Cabin 27	Inspected
Breaker Panel L-111	STBD Passage Way - AFT Cabin 28	Inspected
Breaker Panel 2L-111	STBD Passage Way - AFT Cabin 29	Inspected
Breaker Panel P-466	STBD Passage Way - AFT Cabin 30	Inspected
Port Cabin Deck Passage Way Frame 145		
Lightning Panel 14EL-102	Port Cabin Deck Passage Way Frame 145	Inspected
Cabin Deck-Forward of FSD 50		
20EL-102 Panel	Cabin Deck-Forward of FSD 50	Inspected
Lightning Panel Breaker 8L-132 (N)	Cabin Deck by FSD 44	Inspected



MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Fan Rooms		
MCC4	Fan Room #5	Inspected
#2 Recirc/Exhaust Fan - 2P459	Fan Room #6	Inspected
#4 Exhaust Fan 1P-459	Fan Room #7	Inspected
FWD 450V Vent Panel P-440	Fan Room #8	Inspected
#1FWD Cabin Deck Supply 9P-440	Fan Room #9	Inspected
#3 Central Cabin Deck Supply 10P-440	Fan Room #10	Inspected
Cabin Deck		
1L-110 Lightning Panel (by Ste Room 8A)	Cabin Deck	Inspected
2L-110 Lightning Panel (Across Purser Office)	Cabin Deck	Inspected
1EP-212 Lightning Panel (By FSD #35)	Cabin Deck	Inspected
Heater Panel FWD cabin P-476	Cabin Deck	Inspected
17EL-102 Lightning Panel-(by Purser office)	Cabin Deck	Inspected
Galley Deck		
P.A& galley Deck-Emerg Light (By FSD 33)	Galley Deck	Inspected
L-134 Breaker Panel	Galley Deck/Fan Room	Inspected
Fore Peak/Galley Deck		
MCC3	Fore Peak/Galley Deck	Inspected
#27 Supply Fan 3P426	Fore Peak/Galley Deck	Inspected
#28 Exhaust Fan 2P426	Fore Peak/Galley Deck	Inspected
#29 Exhaust Fan 1p426	Fore Peak/Galley Deck	Inspected
Steering Gear		
STBD Mooring Capstan	Steering Gear	Inspected
Port Mooring Capstan	Steering Gear	Inspected
Sterm Door Operating Station	Steering Gear	Inspected
Steering Unit 1	Steering Gear	Inspected
Steering Unit 2	Steering Gear	Inspected
Vehicle Deck Supply Fan #25-1 P423-1	Steering Gear	Inspected
Vehicle Deck Supply Fan #25-2 P423-2	Steering Gear	Inspected
Vehicle Deck Supply Fan #25-3 P423-3	Steering Gear	Inspected
Vehicle Deck Supply Fan #25-4 P423-4	Steering Gear	Inspected
Vehicle Deck Supply Fan #25-5 P423-5	Steering Gear	Inspected
Vehicle Deck Supply Fan #25-6 P423-6	Steering Gear	Inspected
Vehicle Deck Exhaust #26-1 P423-7	Steering Gear	Inspected
Vehicle Deck Exhaust #26-2 P423-8	Steering Gear	Inspected
Vehicle Deck Exhaust #26-3 P423-9	Steering Gear	Inspected
Vehicle Deck Exhaust #26-4 P423-10	Steering Gear	Inspected
Vehicle Deck Exhaust #26-5 P423-11	Steering Gear	Inspected



MENEZIL ENGINEERING
P.O Box 230
Stuart, Fl 34995

Vehicle Deck Exhaust #26-6 P423-12	Steering Gear	Inspected
Steward Quarters		
LT- Panel 1L-132 - 2nd Deck	Steward Quarters	Inspected
Forward Steward Quarters		
Elevator Machine Room #1 Fuse Panel	Forward Steward Quarters	Inspected
P-274 Breaker panel (by Laundry Room)	Forward Steward Quarters	Inspected
LTG Panel3L-132	Forward Steward Quarters	Inspected
AFT Zone Main Deck Light Panel 1L-111	Store Room - Stair Well	Inspected
Store Room		
#21 Commissary Supply 1P-440	Store Room	Inspected
Fuse panel FOB Cold Boxes	Store Room	Inspected
Reefer Compressor #1	Store Room	Inspected
Reefer Motor Controller Inboard Breaker	Store Room	Inspected
Reefer Motor Controller outboard Breaker	Store Room	Inspected
Reefer Compressor #2	Store Room	Inspected
Main Breaker Panel for Reefers/P-472	Store Room	Inspected
Auxiliary Room- MCC-E		
Main Engine Local Control 4EP-401	Auxiliary Room	Inspected
Fuel Oil Transfer Pump 2EP-401	Auxiliary Room	Inspected
Emergency Air Compressor 1EP-401	Auxiliary Room	Inspected
P421 Refrigerated Van Panel	Auxiliary Room	Inspected
STBD Service Pump 5EP-401		Inspected