

INTEGRATED TECHNICAL SERVICES MARINE ENGINEERING



CCGS Terry Fox
Dry-docking – Refit
F6855-200980
Oct 22/20 – Jan 28/21



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PREAMBLE

1. INTENT

The intent of this specification shall describe the necessary work involved in carrying out the CCGS Terry Fox Drydocking and to complete the Annual Refit Oct. 26/20 – Jan. 31/21. All work specified herein and all repairs, inspections and renewals shall be carried out to the satisfaction of the Technical Authority/Owner's Representative and where applicable the attending ABS Marine Safety Inspector. Unless otherwise specifically stated, the Technical Authority/ Owner's Representative is the Chief Engineer.

2. MANUFACTURER'S RECOMMENDATIONS

The overhaul and installation of all machinery and equipment specified herein shall be as per the manufacturer's applicable instructions, drawings and specifications. The surface preparation, ambient limitations and coating applications shall be as per the manufacturer's instructions and specifications.

3. TESTING AND RECORDS

All test results, calibrations, measurements and readings are to be recorded. Three typewritten copies, in English, are to be presented to the Technical Authority and one copy to the Project Authority within three days following the completion of the applicable work item. All tests are to be witnessed by the Technical Authority and where required, ABS Marine Safety. The Contractor is responsible for contacting ABS when their presence is required for inspections or testing. The Contractor shall advise the Technical Authority in every case when ABS Marine Safety arrives onsite for inspection of vessel's equipment or structure.

4. WORKMANSHIP

The contractor shall use fully qualified, certified and competent tradesmen and supervision to ensure a uniform high level of workmanship as judged by normally accepted shipbuilding standards and to the Owner's satisfaction.

5. FACILITIES

Quotation shall include all of the necessary labor and equipment required for the erection of access staging, rigging, lighting, tugs, pilotage, necessary craneage and line handling.

6. MATERIALS AND SUBSTITUTIONS

All material shall be supplied by the contractor and all materials shall be new and unused unless otherwise specified. All replacement material in the form of jointing, packing, insulation, small hardware, oils, lubricants, cleaning solvents, preservatives, paints, coatings, etc., shall be in accordance with the equipment manufacturer's drawings, manuals or instructions. Where no particular item is specified, or where substitution must be made, the Owner's representative must approve all material offered. Material data shall be provided in English to Chief Engineer.

7. REMOVALS

Any items of equipment to be removed and subsequently reinstalled in order to carry out work specified or for access to carry out the work specified, shall be jointly inspected for damages prior to removal by both the contractor and Owner's representative.

8. EXPOSURE AND PROTECTION OF EQUIPMENT

The contractor shall provide adequate temporary protection for any equipment or areas affected by this refit. The contractor shall take proper precautions to maintain in a proper state of preservation any machinery, equipment, fittings, stores or items of outfit which might become damaged by exposure, movement of materials, sand grit or shot blasting, welding, grinding, burning, gouging, painting or airborne particles of paint. Any damage shall be the responsibility of the contractor. Government furnished equipment and materials shall be received by the contractor and stored in a secure warehouse or storeroom having a controlled environment appropriate to the equipment as per the manufacturer's instructions.

9. LIGHTING AND VENTILATION

Temporary lighting and/or temporary ventilation required by the contractor to carry out any item of this specification shall be supplied, installed and maintained in a safe working condition by the contractor and removed upon the completion of work.

10. CLEANLINESS

The contractor shall at all times, maintain the work areas in which his personnel have access in a clean condition and free from debris. Dirt & debris generated by the spec items shall be cleaned up and removed from the vessel daily. Upon completion of this refit, the contractor shall ensure that the vessel is in a clean condition, free from all foreign material in any system or location placed there as a result of this refit. The contractor shall provide adequate temporary protection for any equipment or areas affected by this refit. The contractor shall dispose of any and all oil and water residue, which accumulates in the machinery space bilges as a result of any refit work detailed in this specification.

11. ASBESTOS

Any and all insulation materials shall be asbestos free and approved for the required application.

12. ENTRY INTO ENCLOSED SPACES

The contractor shall abide by the Coast Guard Enclosed Space Entry Policy. The policy is listed in the attached Safety Annex as section 7.0.9 and section 7.0.9 (N). Entry certificates shall clearly state the type of work permitted and shall be renewed as required by the regulations. Additional copies of these certificates shall be posted in conspicuous locations for the information of ship and contractor personnel.

A fire zone shall be established and naked lights shall not be used within this zone until "gas-free" certification has been issued.

The Contractor is to ensure that any work carried out in confined spaces as defined by the Canada Labor Code complies fully with all provisions of the code.

A number of spaces onboard the vessel are designated as Enclosed Spaces; these spaces are to be entered only under safe and controlled circumstances. The Contractor shall have in place an Enclosed Space Entry Permit system, equal to or better than the procedure contained in the Coast Guard's Safety Management System, section 7.D.9. Ship's breathing apparatus and EEBD's are not to be used except in an emergency.

The Contractor will maintain a log denoting the date, persons in the tank and times in and out. All forms and permits shall be completed in English.

13. Suspension Of Work

The Technical Authority reserves the right to suspend work immediately when that work is being performed in contravention of the Coast Guard's Safety Management System.

Work shall be allowed to resume when the Technical Authority, in consultation with the Contractor and PWGSC, is satisfied that the agreed-upon procedures are in place and being adhered to.

14. HOTWORK

Any item of work involving the use of heat in its execution requires that the contractor advise the owner's representative prior to starting such heating and upon its completion. The contractor shall be responsible for maintaining a competent and properly equipped fire watch during and for one full hour after all hotwork. The fire watch shall be arranged such that all sides of surfaces being worked on are visible and accessible. The contractor shall provide sufficient suitable fire extinguishers and a fire watch during any such heating and until the work has cooled. Ship's extinguishers shall not be used except in an emergency. The Contractor shall abide by the Coast Guard Hotwork Policy. The policy is listed in the attached Safety Annex as section 7.D.11 and section 7.D.11 (N). The contractor shall be responsible to ensure the contractor's personnel including any subcontractors shall follow the policy. All forms / permits shall be completed in English.

15. LOCKOUT AND TAGOUT PROCEDURES

1. The Contractor shall be responsible to protect persons working on board the vessel while working on or near shipboard systems and equipment from accidental exposure to:

- electrical currents
- hydraulic
- pneumatic
- gas or steam pressure and vacuum
- high temperatures
- cryogenic temperatures
- radio frequency emissions
- potentially reactive chemicals
- stored mechanical energy
- equipment actuation

2. The contractor, under the supervision of the Chief Engineer and or the Electrical Officer, shall be responsible for the Lockout and Tagout of equipment and systems listed in the specification.

3. The Contractor shall supply and install all locks and tags and shall complete the Lockout Tagout Log sheet provided by the Vessel.

4. The Contractor shall remove all locks and tags and complete the Lockout Tagout Log sheet provided by the Vessel.

16. PAINTING

All new and disturbed steelwork that will not be on the underwater wetted surface of the ship's hull is to be protected with two coats of Contractor supplied primer. Unless otherwise stated in the individual specification item, the primer is to be International Paints Interplate Zinc Silicate *NQA262INQA026* red. The paint is to be applied as per the manufacturer's instructions on their respective product data sheets. Finish coats are described in individual specification items. Finish coats are to be applied as per the manufacturer's instructions on their respective product data sheets.

17. WELDING

Welding shall be in accordance with the Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)

The Contractor shall be currently certified by the Canadian Welding Bureau (CWB) in accordance with CWB 47.1 latest revision Division I, II or III at the time of bid closing.

The Contractor shall provide a current letter of validation from the CWB indicating compliance with standard CSA W47.1, Division I, II or III. (latest revision)

The Contractor may be required to provide approved procedure data sheets for each type of joint and welding position that will be involved in this refit.

The Contractor may be required to supply a current Welders Ticket for each individual welder that will be involved in this refit.

18. SMOKING

The Public Service Smoking Policy forbids smoking in all Government ships in areas inside the ship where shipyard personnel will be working. The contractor shall inform shipyard workers of this policy and ensure that it is complied with.

19. RESTRICTED AREAS

The following areas are out of bounds to shipyard personnel except to perform work as required by the specifications: all cabins, offices, Wheelhouse, Control Room, Engineer's office, public washrooms, cafeteria, dining room and lounge areas.

20. ELECTRICAL STANDARDS

Any electrical installations or renewals shall be in accordance with the latest editions of the following marine standards:

(a) TP 127E-TC Marine Safety Electrical Standards.

(b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

If any cable installed within this contract is found to be damaged, shorted or opened as a result of the manner of installation, the entire length of cable shall be replaced and installed at no cost to the Department. Plastic tie-wraps may be used to secure wiring in panels or junction boxes only.

21. DRAWINGS

All drawings and drawing revisions that the contractor is requested to do in the execution of this contract shall be of a quality equal to that of the drawings that are requested to be updated. For example, drawings that have been lettered and dimensioned in a professional manner shall not be updated using freehand. Prints and reproductions that a contractor is required to provide shall be made on one piece of paper.

Sign off and acceptance of jobs will not occur until any and all drawings are updated to the satisfaction of the Owner's representative. All revisions shall be noted in English.

22. TRANSDUCERS

The contractor shall not paint the transducers and all transducers shall be afforded the necessary protection during hull cleaning, blasting, burning, welding and coating operations.

23. OWNER'S REPRESENTATIVE

Throughout this document, there is made reference to the Owner's Representative. For the purpose of this document, the Owner's representative is defined as the Chief Engineer of the Vessel.

24. Regulatory Authority Inspections

The Contractor shall confirm a schedule of inspections with the regulatory authority (ABS) for all work described in this specification and shall be responsible for calling them when inspections are required and for ensuring the work is credited by the regulatory authority in the Chief Engineer's 'Hull and Machinery Survey Book'.

The contractor shall ensure the Chief Engineer is informed when the regulating authority is onsite such that the Chief Engineer can witness the inspections by the regulating authority.

Notwithstanding any errors, omissions, discrepancies, duplication or lack of clarity in these project requirements, it shall be the responsibility of the Contractor to ensure that **the execution of the work specified herein is to the satisfaction of the Technical Authority.**

Inspection of any item by the Technical Authority does not substitute for any required inspection by ABS Surveyor.

25. Waste Oil Products

Disposal of waste oil products shall be carried out by the Contractor, or subcontractor, who has been licensed by provincial authorities for the disposal of petroleum products. Copies of certificates must be produced upon request. This must be in accordance with the Coast Guard Policy for Handling Fuel, Oil, and Waste Oil Products, which is part of the Fleet Safety Manual, section 7.C.3. a copy of which is in the attached safety annex.

26. WHMIS

The contractor shall provide current MSDS sheets for any WHMIS-controlled products used onboard or around the vessel at the start of the work period before the products are used. This includes at the minimum MSDS sheets for any solvents, cleaners, chemicals, coatings and blasting grits to be used. Any neutralizing chemicals or specialized protective equipment required shall be provided by the Contractor at all times these WHMIS-controlled products are onboard the vessel.

27. SAFETY ANNEX

The Contractor shall follow the Coast Guard Policies as outlined in the attached Safety Annex. This Annex contains excerpts from the Fisheries and Oceans Canada, Canadian Coast Guard Fleet Safety Manual (DFO 5737) and deals with contractor responsibilities for items such as Hot Work, Confined Space Entry, Diving, Diving Operations, Contractor Safety & Security (10.A.7 FSM) and Drydocking.

An electronic copy of the Fleet Safety Manual (Adobe Acrobat .PDF version) can be found at

<http://142.130.14.20/fleet-flotte/Safety/maine.htm>

Safety Familiarization

The Contractors Basic Safety Familiarization shall be completed for all contractors working on CCG vessels. It will verify that a basic safety briefing has been given, understood and acknowledged by the contractor. All contractors shall follow applicable OHS regulations in accordance with CCG safety/security/environmental requirements, fire alarm protocol and conduct to follow in case of fire or other emergency situations, familiarization of restricted areas and spaces, known risks and hazards encountered at the worksite (ie asbestos, fire fighting systems, hazardous materials, flammables etc).

28. Data Book

The Contractor is to produce two Data Books in English which shall list products, supplies and other purchases by the yard for this refit listing supplier and contact information. This book shall also include the copies of the readings required for the completion of each specification item. The data book shall be 8 X 12" format and binded. The data book shall be indexed and tabbed in the same order as the refit specifications index. Contractor shall also provide 3 CD-ROM's of the data book. The CD ROM's and data books shall be provided to the Chief Engineer prior to the end of refit.

SHIP'S PARTICULARS

Length O.A. ----- 88.0 Metres
Breadth Mld. ----- 17.1 Metres
Draft ----- 7.40 Metres
Displacement ----- 4234 MT
Power-----17,300 KW
Engines-----Stork -Werkspoor 8TM 410 (x 4)
Propulsion-----Diesel- Reducer Gearbox - CPP
Year built ----- 1983

Spec item #: H-01	SPECIFICATION	TCMSB Field #: N/A
Production Chart		

H-01 Production Chart

Part 1: Scope

1.1 The intent is to provide a means for tracking the progress of the refit.

Part 2: References

N/A

Part 3: Technical Description

Production Chart

3.1 The successful Contractor shall supply three copies of a detailed bar chart showing the planned work schedule for the ship's refit. This bar chart shall show, for each specification item, the start date, the duration of work and the completion date. The chart is also to highlight any critical paths.

3.2 The production chart shall be updated weekly or for each production meeting to reflect the actual production on the refit and changes to the anticipated completion dates of each individual item.

3.3 The production chart shall clearly indicate the arrival/departure dates of any Subcontractors/Field Service Representatives.

3.4 The production chart shall include the status and production on each 1379 arising.

3.5 Three copies of the production chart shall be given to the Chief Engineer **the day prior** to each Production Meeting. A copy shall be emailed to the Project Authority (wayne.lambert@dfo-mpo.gc.ca) the day prior as well.

3.6 A copy of the original bar chart shall be provided via email to the PWGSC contracting Officer and Project Authority before the close of business on the day on the start date of the refit.

Subcontractors with Allowances

3.7 The Contractor shall provide a weekly update of the hours billed by the subcontractors along with their hourly rates.

3.8 The results shall be tabulated in an excel spreadsheet clearly indicating the Subcontractor, date(s), hours worked and hourly rate for the hours worked.

3.9 The update is to be emailed to Technical Authority, Contracting Officer and Project Authority the day prior to the weekly scheduled Progress Meeting.

Part 4: Proof of Performance

N/A

Part 5: Deliverables

5.1 Contractor shall provide a weekly production chart and excel spreadsheet for subcontractor allowances every week on the timelines indicated.

Spec item #: H-02	SPECIFICATION	TCMSB Field #: N/A
Services		

Part 1: SCOPE:

- 1.1 The following services shall be supplied, fitted and / or connected upon arrival in the dry-dock, maintained throughout the dry-docking period and removed from the vessel on completion of the work period. The Contractor will be responsible for any additional connections required when the ship is moved between the dry-dock and alongside berth at the Contractor's facilities.
- 1.2 The services are required for the full refit / dry-dock period. Each item is to be priced separately.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT
- 2.2.9. (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10. (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1. Canada Shipping Act

2.4 Owner Furnished Equipment

- 2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The Contractor is to quote a global price and daily rates for all services supplied to the vessel during the dry-docking period.

READINGS AND REPORTS

- 3.1.2.** Contractor shall collect and bind all readings and reports in a booklet form. Three (3) bound copies shall be delivered to the Chief Engineer at the end of the contracted refit period along with a CD-ROM or memory stick.
- 3.1.3.** The Contractor shall also send an electronic copy (CD-ROM or memory stick) to the Technical Authority prior to the end of the refit period.

ELECTRICAL POWER

- 3.1.4.** Shore power facilities are to be supplied to the ship using a single 400-amp source using the Contractor's cables and fittings. The ship requires 1 x 400 amp x 600 VAC x 60 Hz x 3-phase power source for connection to the ship's shore power transformer. The Contractor will quote on supplying 6000 kW-hours per day. The Contractor will quote per kW hour for adjustment purposes on actual amount consumed.
- 3.1.5.** The meter readings are to be taken from the ship's shore power meter located on the main switchboard. The meter readings will be recorded by the Contractor and the Chief Engineer's designate at the time of connection and disconnection.

FIRE MAIN

- 3.1.6.** Water shall be maintained to the vessel's fire main at a pressure of 550 kPa (80 psi) and be continuous 24 hours per day. The supply line shall be fitted with an isolating valve and a pressure-regulating valve (with pressure gauge) which will be located on the ship connected to the ship's international shore connection. Drains shall be fitted in the event of cold weather.

GANGWAYS

- 3.1.7.** The Contractor will supply and erect 2 gangways, complete with safety nets, guardrails and adequate lighting to the satisfaction of the Commanding Officer. The main gangway will land on the aft deck, secondary gangway on the fore deck. The gangways are to be safe, well lit and structurally suitable for the passage of shipyard workers and ship's crew. The Contractor is to maintain the gangways in a safe condition throughout the duration of the dry-docking.
- 3.1.8.** The ship's gangway will not be used during the refit / dry-dock period except with the approval of the Commanding Officer and at no liability to CCG.
- 3.1.9.** Any movement of the gangways required by the Contractor will be at the expense of the Contractor.

INTERNET/PHONE

- 3.1.10.** The Contractor shall provide unlimited high speed internet and phone service to the vessel for the duration of the refit period.
- 3.1.11.** The service will be active 24 hours per day for the duration of the contract.
- 3.1.12.** The Contractor will be responsible for giving notice for connection / disconnection of the telephones as required for any ship movements.

3.1.13. The Contractor will supply a listing of shipyard telephone numbers, fire, police and emergency telephone numbers to the Chief Engineer when the ship arrives in the Contractor's yard.

3.1.14. Long distance charges to be billed to:

Superintendent, Vessel Support

DFO, Canadian Coast Guard

PO Box 1035

Dartmouth, N.S.

B2Y 4T3

Attn: CCGS TERRY FOX

POTABLE FRESH WATER

3.1.15. The Contractor has completed the applicable paragraphs of the Safety Requirements before a connection to the vessel is made.

3.1.16. Potable water shall be supplied through a fresh water filling line (c/w reducing valve and pressure gauge) at the ship's fresh water connection located on the Main Deck (Frame 02) port or starboard side. Contractor to supply approximately 5 m³ per day.

3.1.17. Contractor will also supply any fresh water and / or hot water required for the cleaning, testing or flushing of tanks as required by the Specification from a source separate from the ship's potable fresh water connection.

SEWAGE CONNECTION

3.1.18. Contractor to connect a 2.5" diameter connection pipe and hose to the sewage system overboard discharge, located between frames 112 & 113 starboard side. The discharge to be lead away from the ship's side to the Contractor's sewage outlet facilities. The connection to be removed on completion of docking.

3.1.19. Note: this connection to be made within 4 hours of ship dry-docking.

GARBAGE REMOVAL

3.1.20. A suitable garbage container *with cover* is to be provided for the duration of the refit. The garbage container shall be a minimum of 6 m³ and is to be placed on the Main Deck aft in a location agreed upon by the Contractor and the Chief Officer.

3.1.21. The ship's garbage container shall be emptied at a minimum of every 3 to 4 days, more often if required by smell or capacity.

3.1.22. Garbage containers for use of the Contractor for disposal of debris etc. may be located on the Main Deck aft in locations agreed to by the Chief Officer. These containers shall be emptied on a regular basis.

BERTHING

3.1.23. The berthing and mooring facilities are to be suitable for a vessel of this size and are to be to the satisfaction of the Commanding Officer.

3.1.24. During the contract period, if the ship is not in the dry-dock, the ship is to be berthed at the Contractor's wharf at a safe and secure berth with adequate water at extreme low tide to ensure the vessel will not touch bottom.

3.1.25. The Contractor is responsible for all movements of the vessel during the contract period, including arrangements and costs for line handlers, tugs, pilot's etc.

CLEANING

3.1.26. The Contractor is to ensure all spaces, compartments and areas of the ship, external and internal, are left in an “as clean condition as found”.

3.1.27. The cost of removing dirt, debris and cleaning up work areas to the “as clean a condition as found” shall be included in each specification item.

OILY BILGE WATER

3.1.28. The Contractor shall quote on removing 20 m³ of oily-water from the ship’s bilge’s and tanks. The quotation is to include the cost of cranaage, pumping, trucking and disposal of oily mixture. The Contractor is to provide the name of the firm contracted for the pumping and disposal of the waste oil.

3.1.29. Contractor will quote the cost of disposal of 1 m³ for prorating purposes. The Contractor will advise the Chief Engineer when oily bilge water is to be pumped out and a copy of the shipping manifest, indicating the volume of oily-water removed, is to be given to the Chief Engineer.

CRANAGE

3.1.30. Contractor to bid on supplying general services of a dockside crane, driver and rigger for 20 hours during the dry-dock period as and when requested by the Chief Engineer. Contractor to quote an hourly rate for adjustment purposes.

3.2 Location

3.3 Interferences

3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

N/A

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Copies of all readings and services provided shall be given to the Chief Engineer.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: H-03	SPECIFICATION	TCMSB Field #: N/A
Dock & Sea Trials		

Part 1: SCOPE:

- 1.1 The intent of this specification is to have the Contractor onboard to perform a minimum of three hours dockside trials, and six hours of continuous sea trials.
- 1.2 The intention of the dock trials is to run up the affected machinery during the past refit (M/E, shafting, **Rudder Survey and OD Box Overhaul**, etc.) to operating temperatures and pressures, check for abnormal vibrations and temperatures, record operating parameters from the main gearbox and main engine. The load is limited on the main engine while at the dock to ensure no damage to the shafting, propellers, rudders, etc, occurs.
- 1.3 The intention of the sea trial is to run for 4 hours at the maximum pitch permitted by the Chief Engineer.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 N/A

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT
- 2.2.9. (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10. (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1. Canada Shipping Act

2.4 Owner Furnished Equipment

- 2.4.1 The Contractor shall supply all materials, equipment, labor, and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1 On completion of all specification items and after the vessel has been undocked, dock trials shall be carried out at the contractor's facility. Note, Coast Guard shall provide the date as to when the vessels crew shall return to vessel to assume care and custody and be available for conducting trials.
- 3.1.2 The vessel shall be given 36 hours to run up the vessel after it has been undocked before trials begin.
- 3.1.3 The Contractor shall ensure there are sufficient personnel (4) onboard to attend to/repair any faults directly related to the equipment worked on by the Contractor during the refit. Contractor is to provide the respective personnel to conduct Q/A acceptance in accordance with their approved Quality Assurance program.
- 3.1.4 The Contractor shall ensure the workers available perform dock trials with the amount of pitch, ahead, astern movements being limited to what the Owner's Representative feels is a safe level. This shall be performed for four hours to allow everything to rise to operating temperatures and settle out. Once this is deemed to be satisfactory by the Chief Engineer and ABS Inspector, the sea trials shall be scheduled.
- 3.1.5 Sea trials shall be scheduled for six hours and the contractor shall ensure there are sufficient workers available to attend to any repairs required to affected machinery.
- 3.1.6 The 1205 Acceptance document shall not be signed by the Chief Engineer until the Sea Trials have been successfully completed to the satisfaction of the Chief Engineer.
- 3.2.1 Location
- 3.3 Interferences
- 3.3.1 The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1 All work shall be completed to the satisfaction of the Chief Engineer and ABS Surveyor.

4.2 Testing

- 4.2.1 These sea trials are to prove the integrity of all the machinery / systems worked on by the Contractor during the past refit, and shall be included in the reports delivered to the Chief Engineer.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The operating condition of the equipment worked on shall be included in the three copies of the work reports in electronic format from the Contractor to the Chief Engineer at the end of refit.

5.2.1 Training N/A

5.3.1 Manuals N/A

Spec item #: H-04	SPECIFICATION	TCMSB Field #: N/A
Freshwater Tank Maintenance		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to open up the two freshwater tanks for cleaning, inspection and testing. The tanks are currently coated with Royal Coatings. The Royal Coating System in the 100 ton DB tank is flaking excessively.
- 1.2 Coast Guard will provide a NACE inspector for the coating work of this specification. The Royal Coating FSR shall be on site to recommend the preparation method for the 100 ton tank coating repair.
- 1.3 This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1. Tank Capacity Plan Drawing # T131027
- 2.1.2. Potable Freshwater Internal Tank – Volume -42 m³, Surface Area 150 M²
- 2.1.3. Freshwater Tank # 6 DB Center –Volume - 108 m³, Surface Area 550 M²
- 2.1.4. Royal Coating Spec Sheets

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Fleet Safety Manual 7.A.12 Potable Water Quality
- 2.2.4. CCG Operational Safety Bulletin OSB 02-2020 Update 7.A.12
- 2.2.5. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.6. Coast Guard ISM Hotwork procedures
- 2.2.7. Coast Guard ISM Fall Protection procedures
- 2.2.8. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.9. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.10. SSPC-SPT

2.3 Regulations

- 2.3.1. Canada Shipping Act.

2.4 Owner Furnished Equipment

2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The following work shall commence as early as possible in the contractor's work schedule.
 - 3.1.2.** The tanks shall be pumped as low as possible by ship's staff. Contractor shall be responsible for pumping out remainder of tank as required to perform this work.
 - 3.1.3.** The contractor shall provide each tank with effective mechanical systems to meet environmental conditions for the surface preparation and coating application. The contractor shall prove the tanks are safe for personnel to enter prior to commencing work in each tank.
 - 3.1.4.** There are two (2) manhole covers for access to # 6 DB center tank, one manhole for access to main potable water tank. Contractor shall open all manhole covers for access for water / mechanical cleaning and painting purposes. On completion of all work, manhole covers shall be installed using new 1/4" neoprene gaskets (CFM).
 - 3.1.5.** Prior to entry into tank, the tank shall be certified safe for entry and hotwork.
 - 3.1.6.** During tank cleaning and painting operations, Contractor shall provide protection to any internally mounted tank level transducers. Before closing up tanks, the Chief Engineer will confirm condition of tank level transducers.
 - 3.1.7.** The tanks shall be hydro blasted and chemically cleaned to remove rust discoloration, mud, scale and loose paint. All water and debris shall be removed from the tank. There are no docking plugs in these tanks and water accumulated from pressure washing must be pumped out using Contractor supplied equipment. The chemical used shall be approved by the Provincial Health Services for its intended application. Proof of such approval shall be furnished to the Chief Officer before work begins.
 - 3.1.8.** Tank surfaces shall be thoroughly dried before mechanical cleaning and painting.
- Coating
- 3.1.9.** The surface preparation and coating shall be applied as per attached Royal Coating Specification for Freshwater Tanks. The three stage coating system consists of EasyPrep, EasyPrime, and EasyFlex.
 - 3.1.10.** The contractor shall provide an enclosure on the outer shell of the ship's hull IWO # 6 DB Freshwater tank frames 27 to 9, 2.5 meters port and starboard of centerline.
 - 3.1.11.** Contractor shall supply all ventilation and dehumidification equipment to ensure the complete drying coatings, and to protect against condensation and humidity.

- 3.1.12.** The contractor shall provide two separate quotations for the surface preparation of the 100 ton tank. This shall be determined by the Coating FSR.
1. Method One: The 100 ton tank shall be swept abrasive blast the entire internals of the tank to remove loose damaged coatings and provide the remaining surfaces with an anchor profile suitable for the Royal Coating System.
 2. Method Two: The 100 Ton Tank shall power tool the entire internals of the tank to remove loose damaged coatings and provide an anchor profile suitable for the Royal Coating System.
- 3.1.13.** The 100 ton tank is fitted with two manhole covers, frame 26 and frame 10.
- 3.1.14.** The tank shall be thoroughly cleaned to remove all debris from the tank.
- 3.1.15.** The three stage Royal Coating System shall be applied to the entire internal surfaces of the 100 ton tank. The NACE inspector shall ensure coatings are applied as per manufacturers specifications.
- 3.1.16.** The contractor shall quote on repairing 5 m² of coating for the 40 ton tank. Quote shall include unit cost per m² for the repair and shall be used for adjustment by 1379 for the total area to be repaired. The above quote shall include surface preparation and coatings. Before coating begins the contractor and Chief Officer will inspect the tanks to agree on the total area involved.
- 3.1.17.** The contractor shall perform all coating repairs in strict accordance with Royal Coating Instructions.
- 3.1.18.** IMPORTANT NOTE: The NACE Inspector will supervise and advise on the entire coating process, including proper coating type, coating dry- film thickness, proper preparation and application environment and procedures, and drying time to complete cure. The contractor shall obtain copies of the following information sheets for the paint or coating product system selected and provides copies to the local CCG representative for inclusion in the Contract file.
Working Procedures;
Product data sheets; and
Material Safety Data (MSD) sheets
- 3.1.19.** On completion of the surface preparation and before the first coat of paint or coating product has been applied, the contractor shall provide the crown with a statement certifying that the surface preparation was completed in accordance with the Manufacturer's instructions. Any deviations to those instructions shall be noted in the certified statement.
- 3.1.20.** Ambient air temperature of the tank shall be constantly monitored during the application and curing period using an electronic data recorder. Temperatures shall be recorded hourly, and printouts submitted as part of the contract deliverables.
- 3.1.21.** Paint application shall not take place when the metal temperature is less than 3 Degrees Celsius above the dew point.

- 3.1.22.** The following information shall also be recorded and submitted as part of the contract deliverables:
Space Temperature and relative humidity level in the tank – before work is started;
The tank shall be allowed to remain stagnant for 48 hours before samples are taken;
Two (2) water samples shall be collected from inside the tank. Sampling means shall be provided.
Two (2) air samples shall be collected from inside the tank;
One (1) blank air sample shall be collected from somewhere outside the tank;
Once samples have been taken, the tank shall be purged and left empty until results are received; and
The air and water samples listed above shall be sent to an accredited laboratory for analysis
The Contractor shall have the air samples, identified above, tested for VOCs
The Contractor shall have the water samples, identified above, tested for:
All parameters identified in paragraph 3.6.7 section 7.F.12 of the fleet Safety Manual;
1-2-4 Trimethylbenzene – 0 ug/L limit;
Diglycidyl ether – 0 ug/L limit;
Epoxypopyl ether – 0 ug/L limit;
Other identified chemicals of concern, based on the MSD sheets.
- 3.1.23.** Contractor shall arrange for services of a Marine Chemist to monitor and record VOC levels in tank atmospheres during cure period.
- 3.1.24.** After paint has fully cured, tanks shall be super-chlorinated with bleach and circulated to a level of 50 mg/L of free chlorine for disinfection and let sit for 4 hours. Contractor shall supply Chief Engineer with calculations used to determine strength of chlorine solution used and number of containers used.
- 3.1.25.** The super-chlorinated water must then be de-chlorinated to a free chlorine level below 0.1 mg/L as per the requirements of the CCG Fleet Safety Manual section **7.F.12.POTABLE WATER QUALITY**. paragraph 3.5 inclusive. Tanks shall be drained by Contractor again to remove all traces of the sterilizing agent.
- 3.1.26. Note:** Contractor shall take three (3) separate water tests while pumping out the de-chlorinated water. NOTE: to ensure the mixture is properly de-chlorinated, the mixture shall be thoroughly circulated.
- 3.1.27.** Tanks shall be filled and pumped out twice more. Contractor shall ensure that all hoses and pumps used during this operation are for fresh water use only. A certificate stating this requirement must be given to the Chief Engineer.
- 3.1.28.** After the tank flushing and refilling has been completed and the tank filled again, and let set for 24 hours. Contractor shall arrange to have samples of the water in each tank tested by a laboratory. Tests shall include those for Coliform, E.Coli, and Volatile Organic Compounds. The water sample reports shall be delivered to the Chief Engineer. The water from the tanks shall not be used for ships consumption until receipt of acceptable drinking water certificates.

3.1.29. A report of the super-chlorination and de-chlorination calculations and tests shall be given to the Chief Engineer.

3.1.30. The contractor shall perform hydrostatic test on each of the tanks for ABS. This can be done in conjunction with the chlorination process of the spec item. The vent heads shall be removed for the test and replaced with new gasket when completed.

3.2 Location

3.2.1. Freshwater Tank 40 ton Frames 9 – 25

3.2.2. Freshwater Tank #6 DB Center Frames 9 - 27

3.3 Interferences

3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

As per Fleet Safety Manual

Note: Technical and testing requirements:

- that the paint chosen for use to coat or patch a tank be a 100% solids, VOC free, product that is certified to NSF-61
- that the application of the coating system must be specified to be in accordance with paint manufacturer's recommendations.
- that all new equipment be specified to be used in the application of the coating
- that the contractor is to require that anyone entering the tanks takes precautions to ensure they do not contaminate the tanks
- that the contractor is to schedule an early start to the preparation and coating work to allow sufficient time for the coating to cure
- that an independent third party NACE certified inspector (with a minimum certification of Coating Inspector Program Level 2) be engaged to verify the work throughout the process and that the specification requires the contractor to provide the NACE inspector access to conduct inspections.
- that a baseline 28 parameter water quality test is to be performed per Section 7.A.12 of the Fleet Safety Manual following super chlorination.
- that another 28 parameter test be done at least 3 days following the baseline test with the water in the tank having remained stagnant between tests.

4.3 Certification

All water Analysis required by the specified work.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor shall provide 3 copies of the item as found, all the work performed and as completed in electronic Format to the Chief Engineer.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: H-05	SPECIFICATION	TCMSB Field #: N/A
Anchors and Cable Inspection		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to perform maintenance, inspection, and rotate bitter ends of the port and starboard anchors and chain. To obtain an ABS survey credit for the anchors and chain.
- 1.2 This work shall be carried out in Conjunction with the following:
 - Chain Locker Maintenance

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.5. Anchor Weight 3.5 metric tons
- 2.1.6. Chain length 15 shots per side
- 2.1.7. One shot of chain weight is 1.3 metric tons
- 2.1.8. Anchor chain diameter is 46 mm.

2.2 Standards

2.1 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT
- 2.2.9. (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10. (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.2 Regulations

- 2.3.1. Canada Shipping Act

2.3 Owner Furnished Equipment

2.3.1 The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** Contractor shall lower the port and starboard anchors and chains to the dock floor. The chains shall be ranged on the dock floor using Contractor's lifting equipment and suitably supported to allow for high pressure water washing. The initial lowering of the anchors & chains to the dock floor and the final stowing of anchors & chains is done using the ship's windlass operated by ship's crew. Contractor is to advise the Chief Engineer 24 hours in advance of either operation to ensure ship's personnel are available.
- 3.1.2.** Work on this specification item to be carried out in conjunction with H – 0 including the requirement for a marine chemist's certificate for confined space entry and hotwork.
- 3.1.3.** Contractor to high-pressure fresh water wash (approx. 5000 psi) anchors and chains to remove all sand, mud and marine growth.
- 3.1.4.** The chains are to be inspected by ABS and Chief Engineer's designate prior to painting. All links are to be inspected and slack studs or missing lead pellets identified and reported to Chief Officer. Repairs to six (6) slack studs to be shown as a separate cost.
- 3.1.5.** Anchor swivels shall be replaced with new CG Supplied swivels. Anchor shanks shall be rotated on anchor connecting pins in crowns to prove freedom of motion – approx. 35° either side of vertical.
- 3.1.6.** Contractor to quote separately on the following work: both anchor chains to be let go at the bitter end flanges. Each bitter end flange is located directly under a warping head. Once the bitter end flanges are unbolted, the windlass can be used to lift up on the bitter ends and secure for unbolting of chains. The first 2 shots of the port and starboard chains (anchor ends) are to be disconnected and rotated to the position of the last shots (bitter ends). The free ends are to re-connected to anchors with babbitt pellets. Center shackle pins are to be sealed, chains secured at the bitter ends and bitter end flanges bolted in place using a 3 mm neoprene gasket at each location.
- 3.1.7.** Note: the requirement to carry out this work will be decided by Coast Guard after the chain inspection.
- 3.1.8.** Before painting the joining shackles, the anchor chains are to be grit swept to remove surface rust. The anchor chain shall have the diameter of several links measured and recorded. Measure 10 links per shot of chain on port and starboard systems. The joining shackles are to be painted with 2 coats of red paint with equal numbers of white painted links on either side. The number of white painted links are to correspond with the number of shots of chain paid out beginning from the anchor-joining shackle. The outer links of each white-painted set are to be marked by stainless steel seizing wire close-hitched around the link stud.

- 3.1.9. The anchors are to be grit swept to remove surface rust. Contractor to apply 2 coats of black paint to each anchor.
- 3.1.10. Paint coatings shall be Amercoat 5450 high gloss alkyd. Primer shall be Amercoat 5105 Alkyd Primer.
- 3.1.11. On completion of above work, cables and anchors to be re-shipped using ship's windlass.
- 3.1.12. Note: before ship's windlass is used, Chief Officer will be advised and all grit blasting debris will have been removed from the windlass' exposed gears by the contractor.

3.2 Location

- 3.2.1. Forward Foc'sle Deck

3.3 Interferences

- 3.3.1 Contractor is responsible for the identification of all interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1. All work shall be completed to the satisfaction of the Chief Engineer.
- 4.1.2. ABS shall inspect anchors and chains to obtain a five year survey credit.

4.2 Testing

N/A

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1 The Contractor shall provide 3 copies in Electronic Format of all work completed with this Spec item.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: H-06	SPECIFICATION	TCMSB Field #: N/A
Chain Lockers		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to open up chain lockers for cleaning, abrasive blasting, painting, UT testing and inspection by ABS.
- 1.2** This work shall be carried out in Conjunction with the following:
- Anchors and Chains
 - Void space Cleaning and Inspection

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Burrard and Yarrows Windlass Arrangement Including Pockets Drawing # 31-00-01

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1.** Canada Shipping Act

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The port & starboard chain locker hatch cover is located on the Foc'sle Deck just aft of the anchor windlass; port of centerline frames 144 - 145. Contractor shall lower each anchor and cable to the dry-dock floor until the cable reaches the bitter end.
- 3.1.2.** The volume of each chain locker is 94 m³ with a total internal surface area of 162 m² including the division plate. Chain locker shall be certified safe for confined space entry and hot work by a marine chemist for the duration of this work.
- 3.1.3.** Contractor is advised the false floor gratings are very heavy and their movement for cleaning purposes will require lifting equipment. Some form of staging may be required to access the upper levels for cleaning, abrasive blast and painting purposes.
- 3.1.4.** Contractor shall cut access holes on the port and starboard side of the windlass to access both sides of the chain locker. Access holes shall be located where old cuts have been used. The false floor plates shall be removed to be shipyard shop to be abrasive blasted and coated.
- 3.1.5.** The entire internal surface of the chain lockers shall be abrasive blasted to SSPC-SP 10 / NACE # 2 (Sa 2 ½). Pump suction shall be plugged during blast and clean up. Extraction units shall be used during blasting and coating.
- 3.1.6.** All grit, mud and other loose material shall be removed ashore. The mud boxes and strainers shall be proven clear. Chain locker pump is located in the Bubbler Compartment. The port and starboard pump suction piping shall be uncoupled and the piping proven clear to the satisfaction of the Chief Engineer.
- 3.1.7.** Contractor to quote on removing 250 liters of dirt & debris per bilge suction (500 liters total). NOTE – this amount does not include any accumulated water from the cleaning of the chain locker.
- 3.1.8.** The bottom of the chain lockers shall be UT tested. Locations will be identified with paint marker. Allow 200 shots to be tested with emphasis on the perimeter adjacent to bulkheads and bilge suction wells.
- 3.1.9.** The chain lockers shall be inspected by ABS and Chief Engineer's designate prior to painting.
- 3.1.10.** The entire internal surface of the chain lockers and the gratings shall be coated with International Paint products: one coat primer – Intertuf JVA 202 (non-black) and two finish coats – Intertuf JBA 016 (contrasting colors per coat).
- 3.1.11.** Bilge strainer plates shall be cleaned and holes reamed. Strainers shall be painted with one coat of Intertuf JVA 202.

3.1.12. False floor gratings shall be reinstalled in their original location. Access holes and inserts shall be prepared for re-fitment and welded in as per ABS regulations. ABS shall inspect the fit up and the final welded inserts. Welds shall be 100% UT. Damaged coating from welding shall be repaired as per surface preparation and coating of the chain lockers.

3.1.13. All materials and staging shall be Contractor (CFM) supplied.

3.1.14. After paint has cured a final inspection by ship's staff the anchors and cables shall be re-stowed. This also includes completed work of anchors and cable maintenance. Ship's staff will assist using anchor windlass.

3.1.15. Chain locker hatch cover to be closed up in good order.

3.2 Location

3.2.1. Below Foc'sle Deck Frame 144-150 Port and Starboard of Centerline

3.3 Interferences

3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer.

4.1.2. ABS shall inspect the chain locker before coating is applied. The space shall be gas freed certified when surveyor enters chain locker.

4.2 Testing N/A

4.3 Certification N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor shall provide 3 copies in Electronic Format of all work completed with this Spec item.

5.2 Spares N/A

5.3 Training
N/A

5.4 Manuals
N/A

Spec item #: H-07	SPECIFICATION	TCMSB Field #: N/A
Above Waterline Hull Coating and CCG Identity		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to sweep blast the damaged coating areas above waterline hull, repair and apply coatings, including the draft marks and Coast Guard identity as described below. The Hull below the 10m draft line shall be black.
- 1.2 This work shall be carried out in Conjunction with the following:
 - Underwater Hull Coating

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1. Shell Expansion
- 2.1.2. CCG Identity Program Drawings

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT
- 2.2.9. (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10. (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1. Canada Shipping Act

2.4 Owner Furnished Equipment

- 2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. The Contractor shall abrasive blast clean to Commercial Blast Cleaning SSPC-SP 6 (NACE #3) to damaged areas on above waterline hull area. Lightly Brush-Off Blast one (1) meter below the top edge of the INERTA coating to obtain an anchor profile for the above waterline coating to adhere. All areas from 10 m above baseline to bulwarks or exterior deck level, as applicable, are to be dealt with:

- Stern roller to frame 65 – 10 m to top of bulwarks (including stern roller)
- Frame 65 – 123: 10m – 13.5 m (up to Foc'sle Deck)
- Frame 123 – Stem: 10m – 14.5 m (to top of bulwarks)
- All measures taken to prevent undesirable ingress of blast grit into ships openings, machinery and equipment. The contractor shall plug deck scuppers and discharges as well as take other measures necessary to prevent any liquids from contaminating areas being prepared or coated. The contractor shall also take measures to ensure that no damage, unnecessary cleaning, or any repairs result from either the hull preparation process or coating application. Measures shall be taken to ensure that surfaces and equipment, other than those specified, are not coated and that the coating shall not block any inlets or discharges in the shell. Deck machinery and other gear shall be protected from damage by grit and coatings.

3.1.2. The total area involved for painting is approximately 500 m² (5382 ft²).

Anchor Pockets

3.1.3. The anchor pockets shall be completely abrasive blasted to SSPC-SP6 Commercial Blast. The contractor shall quote on 10 M² for each pocket. The contractor shall apply two coats of International Intergard 264 Abrasion Resistant Epoxy at 5-6 mils DFT per coat with sufficient feathering, color grey for first coat. Apply the final coat with International Intergard 264 Abrasion Resistant Epoxy at 5-6 mils color Black.

Surface Preparation

3.1.4. Abrasive Blast the damaged coating areas as describe in section 3.1.1 to SSPC-SP-6 Commercial Blast Coating and feathered back to intact coating. Quote 50M² for damaged areas and include unit cost for 1 M² to be adjusted up or down by 1379. Cost of damaged areas shall include the primer coating back to the feathering.

Primer

3.1.5. Apply two coats of International Interprime 234 to damaged areas with contrasting colors. Apply @ 2 to 3 mils DFT per coat. First Coat shall be off-white and second coat shall be red.

Topcoat

- 3.1.6.** Apply two full coats of International Interlac 665 to the entire above waterline area. Apply @ 40 microns DFT per coat. Colour Coast Guard Red .
- 3.1.7.** Contractor to paint hull markings as per Coast Guard supplied drawings for Identity Program.
- 3.1.8.** Coast Guard hull markings, including logos, ship's name, stripes, port of registry and all other hull markings are to be painted with 2 coats of International Interlac 665 white paint. CCG will supply stencils as required.
- 3.1.9.** The interface with the under water hull coating and the above waterline hull coat line shall be coated with a 300mm overlap of above water line hull coating.
- 3.1.10.** All coatings shall be in strict accordance with manufacturers application instructions.
- 3.1.11.** After completion of work all protective covers, plugs etc. are to be removed and stencils are to be returned to Chief Officer.
- 3.1.12.** Man-lift and or scaffolding shall be made available to CCG representative to witness all thickness readings.

3.2 Location

- 3.2.1.** Exterior Hull Above Water Line

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer and Chief Officer
- 4.1.2.**

4.2 Testing

The contractor shall provide DFT readings to the owners representative following each coat. The owners representative shall witness the readings as they are taken. In conjunction with any functional quality assurance procedure, the following points will be carried out:

- Provide a list of batch numbers with corresponding dates of manufacture.
- Record the quantity and type of any solvent added.
- Measure and record the ambient conditions.
- Record details of spray tips and pressures.
- WFT guage readings to be taken on a regular basis during application.

- Using a calibrated DFT guage, fifteen (15) measurements per 100 square ft. are to be taken and recorded. Upon agreement of consistency with the Chief Engineer, fifteen (15) measurements per 1000 square ft. are to be taken and recorded.
- All recorded information is to be typewritten and three (3) copies are to be given to the Chief Engineer.

4.3 Certification N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor shall provide 3 copies in Electronic Format of all work completed with this Spec item.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: H-08	SPECIFICATION	TCMSB Field #: N/A
Fixed Fire Fighting Systems Inspection		

Part 1: SCOPE:

- 1.1 Contractor shall arrange for inspection, testing and recertification of all ship's fixed and portable fire extinguishing systems, as described and listed below, by an authorized service provider. Proof of credentials and certification of service provider shall be made available to Chief Officer.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.9. N/A

2.2 Standards

2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.

2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)

2.3 Regulations

2.3.1. Canada Shipping Act

2.4 Owner Furnished Equipment

2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. Contractor shall have an allowance of \$10000 for the services of a certified technician to inspect and provide inspection certificates for all items listed, to be adjusted up or down via 1379 action upon proof of invoices.

3.1.2. No components or parts shall be replaced without the prior consent of the Chief Officer. Any parts replaced shall be turned over to Chief Officer. Inspection and testing of all equipment shall be witnessed by a senior ship's Officer.

3.1.3. All certificates and service reports issued by the Contractor for this work must refer to each serviced component's serial number and location on the vessel. The inspection and certification is to be conducted in accordance with the manufacturer's standards, with the following work requirements to be addressed as part of, or as supplementary, to the standards.

Notifier Systems

- 3.1.4. The vessels equipped Notifier AM 2020 Fire Alarm system shall be thoroughly examined by a qualified technician and inspection certificates issued. The service provider must be certified by Notifier for this inspection activity and must produce the documentation for verification. The inspection and testing is to be witnessed by a Senior Officer.
- 3.1.5. All smoke and heat detectors are to be verified and tested.
- 3.1.6. All bell circuits, pull stations, relays, monitors are to be verified and tested.
- 3.1.7. The panels and alarm functions are to be inspected and tested and all zones inspected.

FM-200 System

- 3.1.8. Eight (8) independent, Kidde fixed FM-200 fire extinguishing systems shall be thoroughly examined by qualified technicians and inspection certificates issued. Systems shall be inspected to current TCMSB standards and as per current Kidde FM-200 marine maintenance manuals for “ECS Series” and “ADS Series” FM-200 systems. Service provider must be currently certified by Kidde for this inspection service and must produce documentation to verify same.
- 3.1.9. All manual and electric pull cables shall be inspected and tested.
- 3.1.10. All gas piping shall be inspected, blown through, proven clear and pressure tested.
- 3.1.11. All sirens, horns and bells shall be inspected and tested.
- 3.1.12. All gas cylinders shall be weighed and Net weight determined and recorded.
- 3.1.13. All time delay functions shall be tested and proven correct.
- 3.1.14. All pressure activated switches for fire alarm initiation shall be tested.
- 3.1.15. All pressure activated switches for shutdown functions shall be tested.
- 3.1.16. Contractor to visually inspect all FM200 bottles at deck level for possible excessive amounts of corrosion or rust accumulation of exterior of bottles. Chief Engineer shall be advised immediately if any problems are found.
- 3.1.17. System shall be properly reassembled in good working order. All cylinders shall be firmly secured in their respective mountings. Three (3) typewritten copies Inspection certificates shall be submitted to the TA and the Chief Engineer.
- 3.1.18. Final inspection of completed work shall be undertaken by Contractor’s charge hand in the presence of the designated ship’s Officer. All work shall be to the satisfaction of the Chief Officer and TCMSB.
- 3.1.19. No system shall be left non-functional over a week-end period.

Galley Fire Suppression System

- 3.1.20. The Kidde RANGE GUARD MODEL RG - 2.5G c/w 2.21 gal. Karboly fire suppression system shall be serviced and tested and inspected in accordance with Kidde Wet Chemical Fire Systems manual, 2006. Service provider must be Kidde certified.
- 3.1.21. Contractor shall test and prove clear the piping and nozzles and ensure there are no foreign materials in the piping system that could prevent these systems from working correctly. All piping support brackets shall be verified in place and correctly fastened.

- 3.1.22. Contractor shall inspect cylinder, cylinder valve and control head assembly. Cylinder should not show evidence of corrosion or damage. Cylinder charge shall be determined and verified correct. All functions and adjustments of control head shall be verified correct.
- 3.1.23. Remote manual release pull station and actuating cable shall be proven functional.
- 3.1.24. All fusible links (three of 360°) must be renewed with new links with the correct temperature rating.
- 3.1.25. All system control functions must be proven functional such as Fan shut down, range and fryer shut down, alarm initiation etc.
- 3.1.26. The system shall be returned to working order.

Gaylord Ventilator

- 3.1.27. Galley Temperature sensing device for Gaylord Ventilator system shall be tested and proven functional.
- 3.1.28. Temperature actuated ventilator damper shutdown and alarm function shall be tested and proven functional.

Paint Locker CO2 System

- 3.1.29. Paint locker cabinets are fitted with an independent 25 lb CO2 flooding system with local, manual release. This system shall be inspected similarly to all others.
- 3.1.30. Bottle and head shall be inspected, bottle charge shall be confirmed, all discharge piping and nozzles shall be proven clear.

3.2 Interferences

- 3.2.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1. All work shall be completed to the satisfaction of the Chief Engineer and ABS.

4.2 Testing

- 4.2.1 Bottles tested shall have Certificates provided.

4.3 Certification

- 4.3.1 Proof of Certification shall be provided.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1 Contractor is to provide service reports for all inspected systems identifying defects discovered and rectified. Certificates are to be provided for all systems.

5.2 Spares

5.3 Training

5.4 Manuals

Spec item #: H-09	SPECIFICATION	TCMSB Field #: N/A
Lifeboat and Davit Annual Inspection		

Part 1: SCOPE:

1.1 The intent of this specification shall be for the contractor to supply the services of a Palfinger Marine Representative to carry out annual inspection on the vessel's Lifeboat and Lifeboat Davit in accordance with Palfinger Marine procedures and checklists.

1.2 This work shall be carried out in conjunction with the following:

Annual Inspection, Starboard Miranda Davit.

Part 2: References:

2.1 Guidance Drawings/Nameplate Data

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard

2.3 Regulations

2.3.1 Canada Shipping Act.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labour and parts required to perform the specified work unless otherwise stated.

Part 3: Technical Description:

3.1 General

3.1.1. The contractor shall supply the services of a Palfinger Marine representative to supervise annual inspection on the Lifeboat and Davit in accordance with Palfinger Marine procedures and checklists. Summary inspection of key components to be carried out as quickly as possible to identify critical path, and possible purchase of long-lead items.

3.1.2 Contact information for the FSR: ryan.fagan@palfingermarine.com

3.1.3 The Contractor shall inform Chief Engineer of testing and inspecting times.

3.1.4 The Lifeboat Davit shall be locked out by ship's Electrical Officer.

3.1.5 Contractor shall inspect for damage to the Fibreglass reinforced laminate (FRP) both inside and out. All hull penetrations and steering mechanisms shall be inspected for wear and correct operation.

3.1.6 Contractor shall drain oil from the winch gear case and remove gear case cover. Contractor shall inform the Chief Engineer if there is any water content showing in the used oil. Contractor shall inspect the gear case for wear and damage. Contractor shall measure and record all backlash on all internal gears. Contractor shall remove winch from bedding for blast inspection and Thickness Measurements. Bedding shall be primed with 2 coats Marine GRADE primer and winch re-installed with contractor supplied fasteners.

3.1.7 Contractor shall prove that the gear case vent is free and clear and functioning properly to prevent internal pressure. Contractor shall flush the gear case with new oil until all residue water and dirt is removed. Contractor shall fit the gear case oil drain plug with pipe sealant and fill the gear case to the correct operating level with ship supplied oil. Contractor shall replace the gear case cover with a new gasket. Oil shall be vessel supply.

- 3.1.8** Contractor shall dismantle the winch brake assemblies to gauge wear and check for signs of heat. This will include dismounting the manual hand brake and centrifugal brake assembly from its shaft. Brake linings and centrifugal brake pads shall be inspected for wear and damage. Brake lining retaining screws shall be inspected. Centrifugal brake springs shall be inspected for wear and damage. Wear measurements of the brake linings shall be recorded and compared to manufactures specifications, if measurements are below specifications Contractor shall renew brake linings.
- 3.1.9** Contractor shall clean all parts including any brake dust from brake housing. Contractor shall de-glaze the running contact surfaces of the centrifugal brake drum housing and the hand brake inner cone clutch by machining them true. Contractor shall check with the manufacturer to obtain the minimum rotor thickness tolerance.
- 3.1.10** Contractor shall re-assemble brake assemblies using Loctite on the all brake lining securing screws. After re-assembly the breaks shall be adjusted to correct setting. Davit shall be lowered under load to test operation of the brakes after all work on davit completed.
- 3.1.11** Any replacement parts will be Owner-supplied.

3.2 Location

- 3.2.1.** The Lifeboat and Davit are located on the starboard side of the Foscle deck.

3.3 Interferences

- 3.3.1.** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: Proof of Performance

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer and ABS.

4.2 Testing

- 4.2.1.** Davits are to be functionally tested in accordance with Palfinger Marine procedures and checklists.

4.3 Certification

- 4.3.1.** Instruments or accessories required to perform testing of davits shall be certified and calibrated (i.e. loads cell or stones used to test davit structure)

Part 5: Deliverables:

5.1 Drawings/Reports

- 5.1.1** The contractor shall arrange for the Palfinger Marine FSR and shall provide three typewritten reports detailing the inspections and his findings to the Chief Engineer.

5.2 Spares

5.3 Training

5.4 Manuals

Spec item #: H-10	SPECIFICATION	TCMSB Field #: N/A
Miranda Davit Annual Inspection		

Part 1: Scope:

- 1.1** The intent of this specification shall be for the contractor to supply the services of a Palfinger Marine Representative to carry out annual inspection on the vessel's Miranda Davit.
Exchange centrifugal brake with new CCG supplied unit.
- 1.2** Contractor shall bid with an allowance of \$40k, to be adjusted up or down by 1379 action, for the services of the Palfinger Marine Field Service Representative to supervise the inspection of the Miranda Davit.
- 1.3** This allowance encompasses FSR services for both H-09 and H-10. The Contractor shall allow one labourer and one millwright for 120 hours EACH to assist the Palfinger Marine FSR for work encompassed in H-09 and H-10.
- 1.4** This work shall be carried out in conjunction with the following:
- 1.4.1.** H-09 Annual Inspections, Lifeboat and Davit

Part 2: References:

2.1 Guidance Drawings/Nameplate Data

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)

2.2.7. CWB CSA 47.1 latest revision Division I, II or III

2.2.8. SSPC-SPT

2.2.9. (a) TP 127E-TC Marine Safety Electrical Standards.

2.2.10. (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard

2.3 Regulations

2.3.1 Canada Shipping Act.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labour and parts required to perform the specified work unless otherwise stated.

Part 3: Technical Description:

3.1 General

3.1.1 Summary inspection of key components to be carried out as quickly as possible to identify critical path, and possible purchase of long-lead items.

3.1.2 Contact information for the FSR: ryan.fagan@palfingermarine.com

3.1.3 The Contractor shall inform Chief Engineer of testing and inspecting times.

3.1.4 Any replacement parts will be Owner-supplied.

3.2 Location

The Miranda Davits are located on the port side of the foc'sle deck.

3.3 Interferences

Contractor is responsible for the identification of all interference items, their temporary removal, storage and refitting to vessel.

Part 4: Proof of Performance

4.2 Inspection

All work shall be completed to the satisfaction of the Chief Engineer.

4.3 Testing

Davits are to be functionally tested in accordance with Palfinger Marine procedures and checklists.

4.3 Certification

4.3.1. Instruments or accessories required to perform testing of davits shall be certified and calibrated (i.e. loads cell or stones used to test davit structure)

Part 5: Deliverables:

5.1 Drawings/Reports

5.1.1 The contractor shall arrange for the Palfinger Marine FSR and shall provide a typewritten report in electronic format detailing the inspections and his findings to the Chief Engineer.

5.2 Spares

5.3 Training

5.4 Manuals

Spec item #: H-11	SPECIFICATION	TCMSB Field #: N/A
Liferaft Inspection		

Part 1: SCOPE:

- 1.3 The intent of this specification shall be to have our five Liferafts inspected, serviced, and recertified for ABS requirements.
- 1.4 This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1. Life Saving Plan – (78) 1003

2.1.2. Liferafts:

- (a) 25 persons, Type DBC, Serial # XDC5FJ32B313
- (b) 25 persons, Type DBC, Serial # C/208
- (c) 6 persons, Type Zodiac, Serial # XDC8EV38D909
- (d) 25 persons, Type Zodiac, Serial # XDC7EY24A010-D
- (e) 25 persons, Type Zodiac, Serial # XDC16089I112

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT

2.3 Regulations

- 2.3.1. Canada Shipping Act.

2.4 Owner Furnished Equipment

- 2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The five Liferafts shall be removed from the Foc'sle Deck and transported to an OEM facility that is approved by ABS / Transport Canada Marine Safety Branch.
- 3.1.2.** Upon completion of servicing and recertification the rafts shall be returned to the vessel and reinstalled in its original cradle.
- 3.1.3.** The service date shall be stamped near the end of the refit period.
- 3.1.4.** Contractor to allow \$15,000.00 in the bid cost for inspection and recertification cost of the sub-contractor in addition to the cost of the contractors own work. Final cost shall be adjusted on receipt of invoice from the service provider by 1379 procedure.

3.2 Location

- 3.2.1.** Port and Starboard Foc'sle Deck.

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

Certificates of Testing of Liferafts shall be supplied.

4.3 Certification

Certified Technicians performing testing of Liferafts.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** Original certificates shall be given to the Chief Engineer. The contractor shall arrange for the FSR and shall provide a typewritten report in electronic format detailing the inspections and his findings to the Chief Engineer.

5.2 SparesN/A

5.3 TrainingN/A

5.4 ManualsN/A

Spec item #: H-12	SPECIFICATION	TCMSB Field #: N/A
A Deck (Purple) Accommodation Upgrade		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to refurbish the cabins, washrooms, on A Deck and one cabin on Focsle Deck. There are eight cabins and four washrooms for this specification. The contractor shall obtain the services of David Spurrell (Furniture Contractor) to install the pre-fabricated furniture to replace the old furniture.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** General Arrangement A and B Decks Drawing # T13-1051 sheet 3 of 4
 - 2.1.2.** Furniture Details Drawing # 41-00-01
 - 2.1.3.** Furniture List Including Washroom Furniture Drawing # 41-00-01
 - 2.1.4.** Lining Plan Drawing # 40-00-01
 - 2.1.5.** Ceiling Plan Drawing # 40-00-02
 - 2.1.6.** Joiner Details Drawing # 40-00-03
 - 2.1.7.** Deck Covering Plan Drawing # 35-00-01
 - 2.1.8.** Window and Sidelight Schedule Drawing # 28-00-01
 - 2.1.9.** Panel Dimensions: 2200 x 600 x 25 mm Insulated
- Areas To Be Dealt With:
- 2.1.10.** 2nd Officer Cabin 310 - Perimeter –12 meters, Area – 7 M²
 - 2.1.11.** 3rd Engineer Cabin 311 - Perimeter – 12 meters, Area – 7 M²
 - 2.1.12.** Common Washroom – Perimeter 8 meters, Area - 3.5 M²
 - 2.1.13.** Ice Observer Cabin 312 - Perimeter –12 meters, Area – 7.0 M²
 - 2.1.14.** Electronic Tech Cabin 313 - Perimeter – 12 meters, Area – 7.0 M²
 - 2.1.15.** Common Washroom – Perimeter 8 meters, Area - 3.5 M²
 - 2.1.16.** Oilers Cabin 308 – Perimeter 13 meters, Area – 9 M²
 - 2.1.17.** Oilers Washroom – Perimeter 8 meters, Area – 3.5 M²
 - 2.1.18.** Spare Cabin 309 – Perimeter 13 meters, Area – 8 M²
 - 2.1.19.** Spare Cabin 307 – Perimeter 13 meters, Area – 8 M²
 - 2.1.20.** Common Washroom – Perimeter 8 meters, Area – 3.5 M²
 - 2.1.21.** Spare Cabin 201 (Focsle-Deck) – Perimeter 12 meters, Area-8 M²

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1.** Canada Shipping Act

2.3 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

Strip Out Requirements:

- 3.1.1.** The Coast Guard Electronic Technicians will disconnect the LAN system, Sound powered phone system, IC system, and satellite and radio systems from the cabins and lay aside for reuse. Owners will remove all loose equipment, entertainment equipment, books, files etc and store in a safe location to allow for the strip out.
- 3.1.2.** Digital pictures shall be taken of each bulkhead and ceiling to locate all fixtures, switches and receptacles for reassembly purposes.
- 3.1.3.** All wall clothes hooks and door hold backs, signage and muster list shall be removed and retained for reuse. The wooden curtain rod valance shall be removed and stored for reuse.
- 3.1.4.** All wall mount convection heaters shall be removed and discarded. Allow for eleven heaters to be replaced with units of the same make as currently installed on Red deck. Heaters are 1000 watts for the cabins and 500 watts for the washrooms.

Cabins:

- 3.1.5.** All book cases, book racks, chest of drawers, cupboards, desks, beds and wardrobes shall be removed and discarded.
- 3.1.6.** The ceiling panels and perimeter trim shall be removed and discarded. The fluorescent light fixtures fitted in the panels shall be temporarily supported from above. The ventilation diffusers fitted in the panels shall be dismantled to the point where the panels can be removed. The smoke detectors fitted in the panels shall be hung up above the ceiling for reuse. The speakers fitted in the panels shall be hung up above the ceiling for reuse. The ceiling support track system shall remain in place to be used for the new panels.
- 3.1.7.** The light switches, receptacles and speaker control shall be disconnected and laid aside for reuse. Allow for 8 boxes per cabin to be disconnected. The bunk lights and wall mount lamps shall be removed and laid aside for reuse.
- 3.1.8.** The deck covering system consists of 10mm dexotex over steel deck, floor leveler over dexotex, and vinyl covering over leveler. The entire vinyl deck covering system shall be removed and discarded from the cabin decks. The dexotex shall be removed to the bare steel deck from around the perimeter adjacent to the bulkhead panels and fitted furniture; and extend approximately 4 to 6 inches from these areas.
- 3.1.9.** The bulkhead panels shall be removed and discarded from the entire space. The existing panel supports shall remain in situ for the new panel channels to butt against.

Washrooms

- 3.1.10.** The shower stalls are corner units with two open sides.
- 3.1.11.** The sinks in washrooms shall be removed and discarded. All piping shall be disconnected. The sinks and vanities in the cabins with new furniture shall be removed and stored in a safe location for reuse.
- 3.1.12.** Vanity wall cabinets shall be removed and discarded. The cabins with new furniture shall have the vanity wall cabinets removed and stored in a safe location. Wall mounted heaters shall be disconnected and removed. Receptacles and switches shall be disconnected, removed or pushed back for reuse. Vanity lights shall be removed and laid aside for reuse.
- 3.1.13.** The contractor shall remove and discard the deck head panels and perimeter trim from the washroom area. The deck head panels are fitted with light, heat lamp, and exhaust fan louver. These shall be hung up above the ceiling for reuse.
- 3.1.14.** The shower plumbing fixtures, hand rails, paper holder, soap dish, curtain rod shall be removed and reinstalled following the work. All other wall mounted fittings shall be removed and laid aside for reuse. The hot and cold water pipes penetrate the bulkhead panel to the shower valve. The toilet shall be removed and discarded; pipes shall be blanked off. The deck scuppers shall be plugged to prevent any debris from entering the drainage system.

- 3.1.15.** The bulkhead panels shall be removed from the perimeter of the washroom. The deck tiles, boarder tiles, Dexotex Décor epoxy system and underlayment shall be removed to expose the steel deck. This includes washroom area, shower area and the raised lip approximately 12 inches high that encloses the shower stall.
- 3.1.16.** Steel structure used for the toilet seats shall be cut from the deck and discarded.

Installation Requirements

- 3.1.17.** The steel deck exposed following the removal of the underlayment and paneling shall be power tooled cleaned to bare metal. The surface of the steel deck shall be prepared in accordance with the manufactures specification for the new deck covering system. The deck areas shall be coated with two coats of epoxy primer with sufficient feathering up the ships side plating. The insulation shall be pushed up to allow for the feathering. Extraction fans shall be used to remove all airborne debris. The fans shall be vented to the exterior of the vessel.
- 3.1.18.** Contractor shall allow for cutting bulkhead panels to fit and trim work required providing a finished appearance.
- 3.1.19.** Owner supplied sheet metal support channel tracks shall be tack welded to all the deck areas and above structure to support the new bulkhead panels. The channels shall be installed around the entire perimeter in the same location as the old panels. New owner supplied wood grain panels (W89) for passageways, (Q63E) off white panels for washroom and cabins shall be installed in the channel track system. Penetrations shall be cut in the panels to suit all fixtures that were originally fitted. Penetrations for cables and water pipes that pass through the panels directly shall be fitted with rubber grommets for the full 1 inch panel depth. The top edge of the bulkhead panels shall be fitted with owner supplied sheet metal support channel tracks. The channels shall be fitted in such a manner that the panels can be removed by lifting and pulling out. The top channels shall be welded to surrounding structure with angle bar or flat bar. Owner supplied colored scheme panel joiners, end caps, inside corners, and outside corners shall be installed to give panel system a finished appearance. The end cap shall be used for panels butting against doors. The edges of the stepped out bulkhead panels shall be finished with edge trim. The passageway panels shall be drilled at a position to align with the steel bracket threaded holes for the handrail system.
- 3.1.20.** New owner supplied insulated perforated and solid ceiling panels shall be installed to the existing track support system. The new panels are 8, 10, and 12 feet long. The longitudinal run of panels shall be divided with owner supplied Omega Profile Dividers to be fitted transversely. The longest panels shall be used where possible. Where panel ends are cut to length, the edges shall be folded in to give a finished appearance. Panels shall be cut out to fit the fixtures that were removed during the strip out, lights, vents, etc. The owner supplied perimeter support system shall be installed to the bulkhead panels. This consists of a two part assembly, Perimeter Angle Upper and Perimeter Z Profile Lower. Panels that run along the inboard and outboard bulkheads shall be cut longitudinally to fit; the edges shall be folded in give a finished appearance.

- 3.1.21.** New toilet foundation seats shall be installed to the deck with studs to allow for fastening the toilets. Teflon spacers with the same shape as the toilet base shall be installed between the toilet base and seat.
- 3.1.22.** The washroom deck surface shall be thoroughly cleaned before the new deck covering system is applied. The new deck covering system shall be installed over the entire areas.
- 3.1.23.** The washrooms shall have 25mm thick of dexotex underlayment over steel deck and then covered with Dexotex Décor Epoxy continuous system. The area shall include washroom, shower stall, the raised section that forms the shower stall, and a 4 inch perimeter border. The color scheme of the Décor Epoxy system shall be determined with the aid of contractor supplied color charts to choose from at the time of application. All coatings shall be applied in accordance with manufacturer's application instructions with particular attention to curing times.
- 3.1.24.** Decorative fiberglass shower stall enclosures shall be installed. The enclosures shall be fitted with pre-molded ledges/shelves with retainer rods for storing soaps, shampoo bottles etc. The style of the shower stalls shall be determined by samples from the contractor and agreed upon by the Chief Engineer. The new enclosures shall extend the full height of the shower stall. The edges of the enclosures shall have decorative edges. The enclosures shall be thoroughly sealed to prevent water from leaking out; the sealing method shall be decorative. The enclosures shall have penetrations to allow for piping. Shower mixing valves shall be replaced with new Crane Rada 722 Control Valves.
- 3.1.25.** The cabin decks shall have 10mm of dexotex underlayment to fill in where the old underlayment was removed and feathered into the existing. An additional 25 ft² per cabin shall be installed IWO of removed bunks, lockers, desks, drawer stands. A layer of floor leveler shall be installed, and covered with vinyl floor covering the same as existing. The perimeter shall have a 4 inch border installed after the new furniture is installed. The border shall be approved material by TCMSB.
- 3.1.26.** The heaters removed during the strip out shall be replaced with new commercial style wall mount convection heaters the same as fitted in the cabins on B Deck. The heaters are 230 volt 1000 watts. The heaters shall have built in digital thermostats, 500 watts in washrooms forced air wall mount.
- 3.1.27.** All penetrations of bulkhead panels and ceiling panels shall be neatly cut and no exposed edges shall be visible.
- 3.1.28.** All the removed items stored for reuse shall be replaced in their original location and fastened to the bulkheads. The power shall be reconnected as originally found. All plumbing shall be reconnected.

Cabin Windows

- 3.1.29.** The windows located in the cabins shall be removed for maintenance and resealing by an authorized glass business. There are six windows total in the cabins on A deck. A man lift shall be required to remove the window although the window frame is removed from the inside and for installation and testing.

- 3.1.30.** The window boxes are fitted with plexi-glass screw to the inboard flange of the window boxes. The plexi-glass is used to reduce the cold draft from the window. The plexi-glass shall be removed and laid aside for reuse.
- 3.1.31.** The window assembly shall be unbolted from the superstructure and removed. The windows measure 610mm x 760mm and fitted with thirty 8mm bolt and nut assembly. The bolts pass in through the superstructure and through the flange of the window assembly. The bolts shall be removed from the superstructure and thoroughly cleaned. The flange area of the superstructure inside and outside shall be power tool cleaned to bare metal and feathered back to intact coating. The bare areas shall be coated with two coats of epoxy primer.
- 3.1.32.** The window assembly shall be disassembled by an authorized window representative. The glass assembly consists of a two pane unit laminated together and retained in the frame by a bolt on plate. The glass shall be removed; the window frame flange, glass pocket of the frame, and the retaining plate shall be thoroughly cleaned of all old sealant and debris. The glass shall be cleaned of old sealant and replaced with new marine approved sealant for sealing superstructure windows. Contractor shall provide data sheet of sealant to be used to the Chief Engineer before applying the product.
- 3.1.33.** The window assembly shall be reinstalled with new 8mm stainless steel bolts and nylock nuts with a length the same as existing. The flange area of the window frame and superstructure shall be covered with a generous layer of approved marine sealant for bonding and sealing window frames to the superstructure. The bolt heads and bolt holes shall be sealed to prevent water from entering the interior. Contractor shall provide data sheet of sealant to be used to the Chief Engineer before applying the product.
- 3.1.34.** The exterior seam of the glass and window frame shall be sealed with the approved sealant.
- 3.1.35.** The plexi-glass shall be replaced following the approval from the testing.

3.2 Location

- 3.2.1.** A Deck Frames 87 – 123

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of all interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

The windows shall be hose tested with fire hose at a pressure of 60 psi. The Chief Engineer shall witness the test along with the ABS inspector if they are required.

4.3 Certification

Data sheets of Marine Sealant products

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor is to provide a written report to the Chief Engineer detailing the information of the work performed with this item.

5.2 Spares N/A

5.3 Training N/A

Spec item #: H-13	SPECIFICATION	TCMSB Field #: N/A
Blue Deck Air Lock Upgrade		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to refurbish the port and starboard Air Locks on Blue Deck.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** General Arrangement Forecastle Deck
- 2.1.2.** Lining Plan Drawing # 40-00-01
- 2.1.3.** Ceiling Plan Drawing # 40-00-02
- 2.1.4.** Joiner Details Drawing # 40-00-03
- 2.1.5.** Deck Covering Plan Drawing # 35-00-01
- 2.1.6.** Panel Dimensions: 2200 x 600 x 25 mm Insulated
- Areas To Be Dealt With:**
- 2.1.7.** Port Air Lock - Perimeter –4.6 meters, Area – 1.2 M²
- 2.1.8.** Starboard Air Lock - Perimeter – 4.6 meters, Area – 1.2 M²

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

2.3.1. Hull Construction Regulations CSA

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. Coast Guard will supply bulkhead panels and ceiling panels.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The ship's Electrical Officer will disconnect the wall mounted light from each Air Lock
- 3.1.2.** The deck head panels shall be removed and discarded. The bulkhead panels shall be removed from the aft and forward bulkheads along with narrow panels around the interior and exterior doors. The existing metal trim shall be removed from around the exterior door and retained for reuse.
- 3.1.3.** The Dexotex has been removed from the deck on both Air Locks.
- 3.1.4.** Contractor shall allow for cutting bulkhead panels to fit and trim work required providing a finished appearance.
- 3.1.5.** Owner supplied sheet metal support channel tracks shall be tack welded to all the deck areas and above structure to support the new bulkhead panels. The channels shall be installed around the entire perimeter in the same location as the old panels. New owner supplied wood grain panels (W89) shall be installed in the channel track system. Penetrations shall be cut in the panels to suit all fixtures that were originally fitted. Penetrations for cables that pass through the panels directly shall be fitted with rubber grommets for the full 1 inch panel depth. The top edge of the bulkhead panels shall be fitted with owner supplied sheet metal support channel tracks. The channels shall be fitted in such a manner that the panels can be removed by lifting and pulling out. The top channels shall be welded to surrounding structure with angle bar or flat bar. Owner supplied colored scheme panel joiners, end caps, inside corners, and outside corners shall be installed to give panel system a finished appearance. The end cap shall be used for panels butting against doors. The edges of the stepped out bulkhead panels shall be finished with edge trim.
- 3.1.6.** New owner supplied insulated solid ceiling panels shall be installed to the existing track support system. The new panels shall be installed. Where panel ends are cut to length, the edges shall be folded in to give a finished appearance. The owner supplied perimeter support system shall be installed to the bulkhead panels. This consists of a two part assembly, Perimeter Angle Upper and Perimeter Z Profile Lower. Panels that run along the inboard and outboard bulkheads shall be cut longitudinally to fit; the edges shall be folded in give a finished appearance.

3.1.7. The decks underlayment for both Air Locks shall be 10mm Dexotex. Followed by Dexotex Décor-Flor M Epoxy System, with a 4 inch border up the new panels.

3.1.8. The areas shall be closed off to allow curing of all products

3.2 Location

3.2.1. Raised Focsle Deck Air Locks, Port and Starboard

3.3 Interferences

3.3.1 Contractor is responsible for the identification of all interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

4.3 Certification

Data sheets of Marine Dexotex products

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor is to provide a written report to the Chief Engineer detailing the information of the work performed with this item.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: HD-01	SPECIFICATION	TCMSB Field #: N/A
Drydocking		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to drydock the vessel for regulatory inspections, maintenance and installation of new equipment as specified in the refit specification for the drydocking.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Docking Plan Drawing # 00-00-08

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1.** Hull Construction Regulations

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The vessel shall be docked and undocked and a suitable number of Lay Days shall be included to perform the work described herein as well as a margin of time to cover work arising as specified by the contract. Contractor to quote unit cost per Lay Day for adjustment purposes. All manpower, materials, tugs, pilots etc. required to carry out the work shall be supplied by the Contractor and shall be to approval of the Chief Engineer.
- 3.1.2.** A docking plan is available on board the vessel and will be provided to the successful Contractor. Contractor will be responsible to ensure drawing is returned to vessel upon completion of work.
- 3.1.3.** The underwater external hull of the vessel shall be surveyed by ABS for credit.
- 3.1.4.** The bow overhang shall be supported by at least 1 bow shore. The bow shore is not to be removed until just before ship is undocked. Contractor to prepare keel and margin blocks and fit the necessary breast and bow shores to maintain the true alignment of the ship's hull and equipment for the dry-docking period.
- 3.1.5.** The vessel shall be dry-docked such that dry-docking plugs, sea bays, inlet grids, anode plates and transducer orifices are clear of the blocks. Any movement of the blocks necessary for sandblasting and/or painting or removal of docking plugs shall be the responsibility of the Contractor. Contractor shall quote on moving 10 blocks. Contractor to provide a unit cost for moving 1 block for adjustment purposes.
- 3.1.6.** Docking shall be undertaken during the first three days of the contract period. The Contractor shall prepare the dock in advance of the ship's arrival and the official start of the dry-docking. The dry docking shall be under the direct supervision of a Certified Docking Master. If premium time is required for evening shifts or weekend work to meet this objective, the Contractor is to identify this and include all costs in his quotation.
- 3.1.7.** The vessel shall not to be placed in the same dock with any other ship for any part of the contract period. A minimum clearance of 5' shall be available below the keel.
- 3.1.8.** Contractor shall bid a price of \$7000 for tugs and/or pilot services as required. This shall be adjusted as necessary as per required 1379 action.
- 3.1.9.** Contractor shall be responsible for the safe transfer of the ship from the pre-docking berth or location onto its docking blocks. During docking, radio contact shall be maintained between the vessel's Commanding Officer and the Contractor's docking master.
- 3.1.10.** Within 8 hours of docking, cleaning shall commence on the underwater hull by high-pressure fresh water washing (6000 psi minimum) to remove all marine growth and allow preliminary inspection.
- 3.1.11.** Prior to commencing water blasting, all hull mounted equipment and openings shall be fully protected.

- 3.1.12.** The Contractor shall give the Chief Engineer a minimum of 4 hours advance notice before adding / removing fluids from any ship's tanks.
- 3.1.13.** Adequate and safe access to the vessel shall be provided through a minimum of 2 gangways, complete with safety nets, lights, and rails, throughout the drydocking period.
- 3.1.14.** Any contamination of the vessel's hull by materials (i.e. oil) present in the dock shall be cleaned, after the vessel is re-floated and clear of the dock, at the Contractor's expense and to the satisfaction of the Chief Engineer.

3.2 Location

3.2.1.

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

N/A

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The Contractor is to provide a written report to the Chief Engineer detailing the information of the work performed with this item.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: HD-02	SPECIFICATION	TCMSB Field #: N/A
Underwater Hull Inspection and Coating		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to clean, repair coating, and inspect the hull of the vessel. The entire underwater hull is coated with Intershield 163 Inerta 160 coating with the exception of areas on the flat bottom of the hull. These uncoated areas of Inerta shall be abrasive blasted back to intact Inerta or bare steel.
- 1.2 The finished coating scheme shall be black for the areas noted 3.1.1 . The band of red paint that overlaps the black does not adhere to the Inerta coating and flakes off
- 1.3 Enclosures shall be erected for areas of coating application.
- 1.4 This work shall be carried out in Conjunction with the following:
 - Starboard Propeller and Tailshaft Removal
 - Seabox and Seabay Maintenance
 -

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1. Intershield 163 Inerta 160
- 2.1.2. Docking Plan

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT
- 2.2.9. Coast Guard paint Scheme

2.3 Regulations

- 2.3.1. Canada Shipping Act.

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The present area of the hull is coated with Intershiel 163 Inerta 160 with the exception of areas on the flat bottom of the hull. The complete underwater surface area includes and up to the 10 m level above keel (up to and including the fender), stern roller, forward and aft along knuckle chine to just below (but extending up to include areas of anchor pockets) is approximately 3500 m² (37,675 ft²). Care to be taken during blasting and painting operations that stern roller bearing arrangement is protected by blocking off area between closing plate and roller. Roller can be turned by inserting bar in socket holes on starboard side of roller.
- 3.1.2.** The entire underwater area of the ship from the keel to the top of the light water line shall be hydro blasted and cleaned of all marine growth and salts. This shall include rudder, propellers, and thruster tunnel. The cleaning shall be done immediately after the vessel is dry-docked.
- 3.1.3.** The entire underwater hull shall then be inspected by the Chief Engineer, ABS Surveyor, and a supervisory representative from the contractor. The contractor shall plan a suitable date and time for the hull inspection. The contractor shall inform the Chief Engineer 24 hours prior to the inspection time. All parties involved in the inspection shall be present for the inspection. The contractor shall supply and erect staging/scaffolding/manlift as required for the inspection.
- 3.1.4.** Following any required hull repairs the contractor shall make repairs to areas where the hull coating is missing as directed by the Chief Engineer.
- 3.1.5.** In order to avoid any confusion as to the total area to be repaired, the contractor shall assign a representative, who along with the owner's representative to view the ship as it sits on the blocks subsequent to cleaning but prior to coating repairs. The representatives shall view the ship and agree upon the total area of the hull that shall be repaired and coated.
- 3.1.6.** The contractor shall plug deck scuppers, discharges, as well as take other measures necessary to prevent any liquids from contaminating areas being prepared or coated. Before commencement of grit blasting activities, Contractor is responsible for preventing the ingress of grit & other air blown debris through all openings in the ship, including the following:
- Stern tubes, shafting and propellers.
 - Sea bays & sea inlet grids.
 - All bubbler discharge nozzles.
 - All overboard discharge valves.
 - Engine room supply and exhaust fans which cannot be closed with louver doors.

- All void and tank vents.
- Anchor windlass, especially exposed gears, incl. control station.
- Tugger winches & control stations.
- Winches & exposed cables on 40 T & 5T cranes.
- Rudder gland.

Porthole glasses in the hull to be covered with minimum ¼” masonite or plywood and sealed with duct tape on perimeter. The contractor shall also take measures to ensure that no damage, unnecessary cleaning, or any repairs result from either the hull preparation process or coating application. Measures shall be taken to ensure that surfaces and equipment, other than those specified, are not coated and that the coating shall not block any inlets or discharges in the shell. Deck machinery and other gear shall be protected from damage by grit and coatings.

- 3.1.7.** All traces of grit used for blast cleaning, shall be removed by the contractor. The contractor shall be responsible and liable for ensuring that the hull is clear and clean prior to, during and immediately after the coating application.
- 3.1.8.** Abrasive blast material shall not be permitted to enter any part of the vessel. The contractor shall ensure that every opening into the vessel where grit may gain entry is covered.
- 3.1.9.** The Coast Guard will provide the services of a NACE inspector to supervise the surface preparation, environmental condition monitoring, mixing, and application of the coating.
- 3.1.10.** The contractor shall provide all means to ensure the environmental conditions are correct for applying Intershield 163 Inerta 160. An enclosure shall be fitted to enclose the flat bottom area of the vessel’s hull. The approximate area is 400 M² between Frames 55 to 123.

Surface Preparation

- 3.1.11.** Abrasive Blast all bare and rusted areas not coated with Inerta 160 to SSPC-SP-10 Near White Metal. Abrasive blast the remaining area of the flat bottom hull entire hull to remove all the Ameron coating until the old existing Inerta coating is exposed. All edges of intact Inerta coating shall be feathered back to accept new coating. The existing coating thickness is in the range of 200 mils thick. Extensive blasting shall be required to expose the old Inerta coating. Contractor shall allow for 50 M² of bare and rusted areas and 350 M² of intact Ameron coating.
- 3.1.12.** Contractor shall repair all damaged areas of the black Inerta coating for the remainder of the underwater hull. Contractor shall bid on repairing 50 M² of damaged coating that includes the cost of blasting, power tooling, coating, and providing means to comply with the required environmental conditions. Include unit cost of 1 M² for the repair and coating procedures.
- 3.1.13.** All repairs to damaged coating areas shall be completed as per manufacturer’s instructions for repairing Intershield 163 Inerta 160 system.

Topcoat

- 3.1.14.** Apply one full coat of Intershield 163 Inerta 160 to the 400 M² area of the flat bottom hull. Color shall be black. Apply one coat of Intershield 163 Inerta 160 to all damaged areas of the remaining hull. Application of Inerta and DFT shall be in accordance with the products’ data sheet.

- 3.1.15.** Sea-bay grids shall be protected during application of the coating and orifices shall be proven original diameter before undocking. The transducers shall be protected as well. The Contractor shall remove from the ship all traces of grit and air blown debris resulting from the grit blasting operation. Areas to be cleaned on a daily basis include passageways from gangways to entranceways into ship to prevent tracking of the blast debris into the ship.
- 3.1.16.** The Contractor shall be responsible for ensuring that personnel engaged in preparing and applying the paint are experienced and thoroughly familiar with the necessary procedures involved.
- 3.1.17.** All staging, cranes, screens, heaters and environmental control equipment, lighting and any other support services, equipment and materials necessary to perform the tasks set out in this specification shall be supplied by the Contractor.
- 3.1.18.** Suitable storage facilities for the materials and equipment shall be provided close to the work site. These facilities shall be maintained at a temperature recommended by the paint manufacturer and necessary to ensure ease of preparation and application of paint.
- 3.1.19.** Contractor to ensure a backup set of spray equipment is available, to ensure continuous application of paint. No painting is to commence if there is no backup set of spray equipment.
- 3.1.20.** All connections to the hull are to be removed in good order (i.e. welding lugs, grounding connections etc.), ground smooth and coated with the Inerta coating system.
- 3.1.21.** Load line and draft marks to be painted on hull on both sides using International Intergard white paint after the hull coating has cured.
- 3.1.22.** The contractor shall perform the work in strict accordance with International Coatings application instructions for each applicable coating.

3.2 Location

- 3.2.1.** Underwater portion of the entire vessel.

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

The contractor shall provide DFT readings to the owners representative following each coat at the damaged coating areas. The owners representative shall witness the readings as they are taken. In conjunction with any functional quality assurance procedure, the following points will be carried out:-

- Provide a list of batch numbers with corresponding dates of manufacture.
- Record the quantity and type of any solvent added.
- Measure and record the ambient conditions.
- Record details of spray tips and pressures.
- WFT guage readings to be taken on a regular basis during application.
- Using a calibrated DFT guage, fifteen (15) measurements per 100 square ft. are to be taken and recorded. Upon agreement of consistency with the Chief Engineer, fifteen (15) measurements per 1000 square ft. are to be taken and recorded.
- All recorded information is to be typewritten and three (3) copies are to be given to the Chief Engineer.

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor is to provide a written report to the Chief Engineer detailing the information of the work performed with this item.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: HD-03	SPECIFICATION	TCMSB Field #: N/A
Hull Butts and Seams		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to repair wasted areas of welding seams and butts on the underwater portion of the hull.
- 1.2** This work shall be carried out in Conjunction with the following:
 - Underwater Hull Coating
 - Tailshaft Removal
 - Anode Replacement of Impressed Current System
 - Tank Inspections

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Shell Expansion Drawing # 07-00-01

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT

2.3 Regulations

- 2.3.1.** Hull Construction Regulations CSA

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** Hull plate welding butts and seams shall be inspected and repaired by the contractor and re-inspected by the Chief Engineer and ABS.
- 3.1.2.** Seams and butts selected for repair shall be marked, cleaned to sound metal by air arc gouging and / or grinding and brought up to the original level by ABS approved welding techniques and materials. Contractor shall use welding rods suitable for use with Grade EH-36 modified steel. Contractor shall ensure that last pass or “hard cap” over any welded seam is done using 7018 RCR welding rods. All work shall be performed to the approval of ABS and Chief Engineer.
- 3.1.3.** For bidding purposes, Contractor shall include in their bid price the cost of 750 feet of air arc gouging and 2000 bead feet of weld. Contractor shall include a unit cost per foot for air arc gouging and unit cost per bead foot of weld for adjustment purposes. Contractor shall include any staging requirements in quotation.
- 3.1.4.** Butts and seams falling in way of any fuel tanks will require the fuel tank to be gas-freed and certified safe for hot work. Butts and seams falling in way of ballast/void tanks that are painted will require interior paint work to be touched up in way of heat-damaged paint. Cost for gas-freeing shall be provided. Cost for touch up paint shall be provided.
- 3.1.5.** Contractor shall quote on the services of a man-lift and operator for 8 hours for survey and inspection purposes. Contractor shall quote hourly rate for this work.
- 3.1.6.** All work shall be completed to the approval of the Chief Engineer and ABS.

3.2 Location

3.2.1.

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing N/A

4.3 Certification N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor is to provide a written report to the Chief Engineer detailing the information of the work performed with this item.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: HD-04	SPECIFICATION	TCMSB Field #: N/A
5 Year 40 Ton Crane Inspection		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to perform a five year inspection, maintenance and load testing of our 40 ton crane under the supervision of a BLM service technician, Chief Engineer and ABS Surveyor.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 Reference Drawings:

- 1) Drawing 6503520 Telescopic Guiding - Reference 6503520
- 2) Drawing 6503496 Block 40T - 2 Sheaves - Reference 6406806
- 3) Drawing 6503521 Jib Head Sheaves Rev A - Reference 6406818
- 4) Drawing 6503284 Luffing Equiped Block - Reference 6503284
- 5) Drawing 6109495 Fitting of Slewing Bearing - Reference 6406187
- 6) Drawing 6503059 Hoisting Winch 25T - Reference 6406755
- 7) Drawing 6503386 Cab Assembly - Reference 6406759
- 8) Drawing 6503323 Mounting Jib Axle & Cylinder - Ref 6406751
- 9) Drawing 6503532 Repartition Box Rev 1 - Reference 6406768
- 10) Drawing 6503454 Assembly Cylinder V320 C2630 – Ref 6406663
- 11) Drawing 6503522 mounting Cylinder (Telescopic) – Ref 6406819
- 12) Drawing 6503497 Equiped Jack Block - Reference 6503497

2.1.2 Manufacturer: BLM

- Type: Telescopic Electro-Hydraulic Crane 40T/8.5M,35T/10M, 17T/20M
- Identification : NO1539
- General Arrangement : # 97476
- Weight : 24.7 ton

2.1.3 Contact : NOV – BLM

15 rue de la Métallurgie
44482 Carquefou
CEDEX France

2.1.4 Main Motor

- Manuf - BLM
- Volts - 460
- Amps - 175
- KW - 115
- RPM - 1775
- Phase - 3
- Cycles – 60
- Serial - 5014438

2.1.5 **Hyd Circ PP Motor**

- Manuf - Hico
- Volts - 460
- Amps - 6.8
- HP - 5
- RPM - 1725
- Phase - 3
- Cycles – 60
- Frame - 184T

2.1.6 **Gearbox Oil Circ PP Motor**

- Manuf - U.S Electric Motors
- Volts - 460
- Amps - 13.1
- HP - 10
- RPM - 1740
- Phase - 3
- Cycles – 60
- Frame - 215T

2.1.7 **Hyd Cooling Fan Motor**

- Manuf - Emerson
- Volts - 460
- KW - 2.2
- HP - ?
- RPM - 1775
- Phase - 3
- Cycles – 60
- Frame - ?

2.1.8 **Gearbox Oil Cooling Fan Motor**

- Manuf -
- Volts - 460
- Amps - ?
- HP - 1.5 Approx
- RPM - ?
- Phase - 3
- Cycles – 60
- Frame - ?

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9** (a) TP 127E-TC Marine Safety Electrical Standards.
(b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1.** CSA Lifting Appliances
- 2.3.2.** CSA Tackle Regulations
- 2.3.3.** Canada Shipping Act

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The contractor shall allow \$50,000.00 for the services of a BLM service representative. This shall be adjusted following proof of invoice by 1379.

- 3.1.2. Prior to starting work on the crane the contractor and ships Electrical Officer shall discuss the best practice for identifying all electrical disconnections and removals. The Electrical Officer will connect a computer to the PLC and record the readings of the various sensors. The crane will need to be fully functional for this procedure. Sensors to be recorded would include boom extension, drum reel monitor, boom angle indication, and load cell. The contractor shall provide a known weight to lift with the hoist to measure the load. The known weight shall be in the range of 4 to 5 ton.
- 3.1.3. The contractor shall provide a known weight to be suspended from the crane jib crane to enable the service representative to perform a specific rocking test on the slewing ring bearing.
- 3.1.4. The contractor shall lockout the cranes power supply.

Electrical Maintenance

- 3.1.5. *Overview:* The crane's sensors shall be removed for inspection and replaced following the work. The sensors are the Drum counter, Anti-two block, Boom angle, Load Cell, and the Spring Loaded Boom Reel.
- 3.1.6. The cable connecting the main boom reel to the extension boom junction box shall be disconnected at the extension boom junction box and secured on the reel. The junction box is located under a *lead* shield to protect the signals from RFI. This shield shall be removed to access the junction box and upon completion of the work *lead* shield shall be replaced prior to crane operation. Prior to disconnecting wires all terminations shall be identified and recorded for correct terminations.
- 3.1.7. The Load cell is actually the pin that secures the end of the cable. This load cell shall be carefully disconnected and removed prior to the boom maintenance. Cable terminations shall be properly identified and documented prior to removal. The load cell shall be replaced with new CCG supplied load cell and amplifier. New metal cable hangers shall be installed by the contractor to replace all existing and missing hangers.
- 3.1.8. The "anti too block" Sensor is the chrome cylinder located at the end of the extension boom. This shall be disconnected, removed and stored until the boom maintenance period is completed. Cable terminations shall be properly identified and documented prior to removal.
- 3.1.9. The floodlight located under the main boom is to be removed and stored until the boom maintenance is completed. The junction box and junction box glands for this floodlight shall be assessed and replaced as required by the contractor.

- 3.1.10.** The hydraulic cooling fan motor shall be removed to the contractors shop. The contractor shall be responsible for disconnection, reconnecting and alignment issues which may arise during the motors installation. The unit shall be dismantled for cleaning and inspection. On completion of inspection and cleaning the motor windings shall be treated with a vacuum impregnation process or similar process to prevent moisture damage/accumulation in the windings. New bearings shall be installed and the motor reassembled. A one hour bench run shall be completed with bearing temps and motor current readings recorded every 15 minutes. Megger readings shall be taken by the contractor prior to dismantling and upon completion of the one hour bench run. The motor shall be bead blasted, primed and painted. The fan shall be cleaned and inspected prior to installation.
- 3.1.11.** The gearbox cooling fan motor shall be removed and replaced. The contractor shall be responsible for disconnecting, reconnecting and alignment issues which may arise during the motors installation. The replacement motor shall be of equivalent size and horsepower rating as the presently fitted motor, but shall be a totally enclosed configuration and identical in design characteristics to that of the hydraulic cooling fan motor. Motor size shall be determined when the old unit is removed as documentation is limited and it does not appear that any information will be available from the Name Plate. The motor appears to be approx 1 to 1.5 HP range. Megger readings will be taken by the contractor prior to installing the new motor. The old fan will be inspected and assessed.
- 3.1.12.** The main motor, hydraulic circulating pump motor and gearbox oil circulating pump motor shall be removed to the contractors shop. The contractor shall be responsible for disconnecting, reconnecting and transport of the motors as well as motor alignment issues which may arise during the installation of all three units. All three units shall be dismantled for inspection and cleaning, all defects found during the inspection shall be documented. Bell housings bearing bores shall be measured and compared to acceptable dimensions of the bearing. New bearings shall be installed and the motor reassembled. A one hour bench run will be completed by the contractor with bearing temps and current readings recorded every 10 minutes. The contractor shall record the megger readings on all three motors prior to commencement of work and also upon completion of the one hour bench run.
- 3.1.13.** The drum counter sensor shall be removed from the crane body and put in safe storage for reuse. The sensor cable shall be disconnected and marked for correct identification. The unit shall be reinstalled following the work IWO the sensor.
- 3.1.14.** The boom angle indicator shall be removed from the crane body and put in safe storage for reuse. The sensor cable shall be disconnected and marked for correct identification. The unit shall be reinstalled following the work IWO the sensor.
- 3.1.15.** Contractor shall bid on replacing 30 cable hangers and shall include unit cost of each hanger that shall be adjusted up or down for the total hangers required.
- 3.1.16.** The contractor shall allow \$5000.00 for purchase of cabling, glands, terminal connectors, and hangers not specified and shall be adjusted up or down upon proof of invoice by 1379.

Mechanical / Hydraulic

- 3.1.17.** The contractor shall drain the oil from the oil reservoir and dispose of the oil to an authorized disposal facility. The quantity of oil is 800 liters of petro Canada Harmony HVI 22. The tank shall be opened up and cleaned. The manhole cover is located in the crane body upper section. The contractor shall supply new oil to fill the tank to its working level.
- 3.1.18.** The gearbox oil tank reservoir and gearbox shall be drained and refilled with new **Contractor Supplied** oil. The oil shall be disposed of to an authorized disposal facility. The quantity of oil is 100 liters of Petro Canada Traxon 75W90 gear oil.
- 3.1.19.** The contractor shall remove the wire rope from the crane. The end is affixed to the jib head by a pin which is also the load cell. The wire passing through a double sheave block/hook, another double sheave arrangement on the jib head, and a single sheave on the jib head that leads the wire to winch on the crane body. The wire on the winch is affixed to the drum on the last turn. The wire rope shall be laid aside and covered. The double sheave block/hook shall be transported the contractors shop for overhaul, measurement and inspection. The wire rope shall be rigged on the winch and blocks in such a manner to avoid twisting of the cable following the specified work.
- 3.1.20.** The contractor shall disconnect the hydraulic hoses from the crane jib and the cranes hydraulic luffing cylinder to allow the jib to be removed from the crane body.
- 3.1.21.** The hinge pin for the cranes jib and hydraulic luffing cylinder shall be removed to lift the entire jib to the contractor's facility. The hydraulic luffing cylinder shall be supported to the jib during the removal. The weight of the crane jib is 12.11 ton.
- 3.1.22.** Inside the cranes jib is a hydraulic ram unit that provides the telescopic motion of the jibs extension. The ram section of the unit is affixed to the jib and the cylinder moves with the jibs extension. The oil is directed to the cylinder through the center of the ram via a valve block on the ram. The contractor shall remove the access cover from the side of the jib to access the connection of the hydraulic ram. The contractor shall remove the pin that secures the ram to jib and the hoses to the valve block. The extension of the jib shall be removed from the jib and laid aside.
- 3.1.23.** The contractor shall the remove the valve block on the ram of the extension cylinder to allow the ram to be removed from the cylinder. The ram shall be removed and a new seal kit installed, then re-assembled. A new seal shall be installed in the valve block and then reassembled on the ram. Owner shall supply new seal kit and seal.
- 3.1.24.** The Teflon guide plates that provide a bearing surface for the extension jib shall be removed and replaced with new pieces and new screws. There are 15 pieces in total and 100 countersunk screws.
- 3.1.25.** The hydraulic luffing ram unit shall be removed from the crane jib. The pin for the ram shall be removed to allow the removal and overhaul of the ram. The ram shall be disassembled and a new seal kit installed, then reassembled. Owner shall supply new seal kit. The main control valve block shall be replaced with new CCG supplied valve block.

- 3.1.26.** The four removed pins and the bearing bores of the respective pins shall be thoroughly cleaned and laid out for inspection. All grease passages shall be proven clear. The diameters of the same shall be measured at points over the length and recorded. Records of measurements shall be recorded and given to the Chief Engineer. The units shall be reassembled ensuring that all parts are thoroughly greased prior to reassembly. Greasing arrangement shall be proven free and witnessed by the owner's representative.
- 3.1.27.** The two sets of jib head sheaves, one double sheave set and one single sheave set shall be disassembled cleaned and laid out for inspection. The sheaves run on tapered roller bearings between the pins and sheave bores. The pins and sheave bore diameters shall be measured at points over the length and recorded. All grease passages shall be proven clear. Records of measurements shall be recorded and given to the Chief Engineer. New bearings and seals shall be replaced with new CCG supplied parts. The units shall be reassembled ensuring that all parts are thoroughly greased prior to reassembly. Greasing arrangement shall be proven free and witnessed by the owner's representative.
- 3.1.28.** The main double sheave block with hook shall be disassembled, cleaned, and laid out for inspection. The swivel hook shall be disassembled, cleaned, and laid out for inspection. The pins and sheave bore diameters shall be measured at points over the length and recorded. All grease passages shall be proven clear. The hook pin and bearing bores shall have the diameters measured and recorded. The hook shall be removed from the hook pin and the seal at the bottom of the hook shaft shall be replaced with a new owner supplied seal. Records of measurements shall be recorded and given to the Chief Engineer. The units shall be reassembled ensuring that all parts are thoroughly greased prior to reassembly. Greasing arrangement shall be proven free and witnessed by the owner's representative.
- 3.1.29.** The entire jib assembly shall be reassembled as originally found ensuring all areas that require grease are thoroughly greased prior to reassembly. Includes all hoses and wiring that was removed to access the removal of the jib.
- 3.1.30.** The three resilient mounting assemblies that support the operator's cab shall be replaced with new assemblies. One located on the top of the cab and two located under the cab. The upper and lower mounting assemblies differ slightly in design. The assemblies consist of part items 2 thru 17 on the reference drawing. Parts will be CCG supplied. The crane cab will have to be slightly lifted and supported to exchange the mounts.

Slewing Ring / Bearing

- 3.1.31.** The contractor shall remove the 60 exterior studs from the slewing ring and replace with new owner supplied studs, nuts, washers and long spacers. The 60 interior bolts in the crane tower shall be checked for tightness. A hydraulic bolt tensioner shall be used to tighten all fasteners. The procedure for tightening these bolts shall be provided by the FSR.

Hoisting Motor / Brake

3.1.32. The contractor shall provide a separate quote for the removal and overhaul of the hoisting winch assembly if deemed necessary by the FSR. Remove the hydraulic hoses from the hoisting winch hydraulic motor. Drain oil from the gearbox and dispose. Remove the hoisting winch hydraulic motor assembly and store in a safe location. Cover all open hydraulic ports to prevent ingress of debris into the motor. The gearbox shall be removed from the drum end and transported to the yards facility for overhaul. The gearbox shall be disassembled and laid out for inspection. The bearing housing bores shall be measured and compared to acceptable tolerances for the bearings. The hoisting drum shaft and bearings shall be removed from the crane supports and the drum to be supported at the crane tower. The drum shaft shall be cleaned, inspected and replaced with CCG supplied shaft if necessary. The entire assembly shall be reassembled with CCG supplied bearings and seals as originally found. The cover gasket for the hoist winch gearbox shall be replaced with a new gasket. The gearbox shall be refilled with new CCG supplied oil. Sealing surfaces shall be cleaned prior to replacing gasket.

Grease Tubing

3.1.33. The contractor shall remove all stainless steel tubing fitted to the jib and crane body and install new tubing and fittings. The tube runs from an accessible block on the crane body to remote areas of the jib and crane body. Some of these lines are disconnected from the grease points and fitted with nipples. The new lines shall be reconnected to their respective points. Allow fifty brackets to be removed and 75 meters of 1/8" diameter tubing. All grease lines shall be pumped full of grease and proven clear before permanently tightened and witnessed by the owners representative.

Hydraulic Hose and Fitting Replacement

3.1.34. The contractor shall have an allowance \$10,000.00 for hydraulic fittings, pipes, hoses, and miscellaneous fittings for the work specified. This shall be adjusted up or down by 1379 upon receipt of invoice. All exterior hydraulic hoses (~24 in total) shall be replaced with new hoses. Hoses shall be pressure tested and provided with test certificates. All hoses and attached fittings shall be wrapped with Denso Petroleum tape following the work and function test.

3.1.35. All hydraulic fittings, hoses and pipes removed during the work shall be capped or plugged to prevent contamination of the hydraulic system.

3.1.36. The contractor shall assemble all removed equipment and fit to the crane as originally found before the start of work. All parts requiring lubrication shall be thoroughly greased before reassembly.

3.2 Location

3.2.1. Main Deck Port Side

3.3 Interferences

3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.2 Inspection

4.1.3. All work shall be completed to the satisfaction of the Chief Engineer and ABS.

4.2 Testing

4.2.1. The contractor shall obtain the services of a Trihedral Field Service Representative, Bedford Nova Scotia for the load testing of the crane. These people installed the PLC for the crane and would be pertinent to be on site to witness all parameters while loading the crane and readjustments if necessary.

4.2.2. The contractor shall supply weights that range from 5 ton to 40 ton and a current calibrated measuring device to perform the load tests. The tests will vary at different loads to enable calibration of the electronics.

4.2.3. There are several safety features of the crane that shall be proven correct and witnessed by the FSR, Chief Engineer & ABS. Some of these include End Of wire Stop, Slack Wire Stop, Boom Angle Limits, Slewing Limits, Extension Limits, Loads at different boom angles and extensions, Anti Two Block.

4.2.4. Any leaks as a result from the work shall be corrected by the contractor.

4.2.5. The contractor shall have ABS to witness the load test.

4.3 Certification

Certificates for weights used shall be given to the Chief Engineer.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The FSR shall provide a written report in Electronic Format of all the work that was performed on the crane and indicate problems that were found. All measurements shall be recorded and included in the report.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: HD-05	SPECIFICATION	TCMSB Field #: N/A
Seabay Maintenance		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to open the suction and discharge sea bays cleaning, painting, ABS inspection and the installation of anodes. Contractor shall ensure marine chemist certificates for these areas for confined space entry and hot-work are obtained and kept valid as per the General & Safety Notes.
- 1.2** This work shall be carried out in Conjunction with the following:
- Sea Valve Maintenance
 - Central Cooling and Seawater Valve replacement
 - Seawater Impressed current anode system
 - Bubbler Piping Inspection

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Tank Capacity Plan Drawing # T13 1027
2.1.2. Suction Sea Bay Volume 45 m³, Area 210 m²
2.1.3. Discharge Sea Bay Volume 44 m³, Area 200 m²

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

2.3.1. Canada Shipping Act.

2.4 Owner Furnished Equipment

2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** There is 1 docking plug each for the suction and discharge sea bays. The docking plugs shall be removed to drain water from the sea bays during the work. On completion of all work, docking plugs shall have threads dressed and coated with white lead. Thread Tap shall be run through holes and docking plugs installed in good order.
- 3.1.2.** Access to the suction and discharge sea bays is by removal of tank top manhole covers located to the starboard side of the Lower Forward Machinery Compartment, suction sea bay cover Frame 99 – 102, Discharge Sea bay cover Frame 102 – 105.
- 3.1.3.** The Seabays shall be gas freed for entry and hotwork and certified by Marine Chemists. The spaces shall be certified gas free during the entire period of the work description.
- 3.1.4.** All internal surfaces of the forward and after sea bays shall be cleaned of all loose rust, dirt, debris and marine growth by means of high pressure fresh water wash.
- 3.1.5.** Contractor shall remove all debris and dispose of ashore. After cleaning is completed, Contractor shall arrange for inspection with Chief Engineer and ABS prior to mechanical cleaning and painting.
- 3.1.6.** IMPORTANT: The forward bulkhead in the discharge sea-bay at frame 105 and the aft bulkhead in the suction sea-bay at frame 99 are contiguous with tanks containing fuel / lubricating oils. CONTRACTOR SHALL ENSURE THERE IS NO BURNING OR WELDING CARRIED OUT ON THESE BULKHEADS. CONTRACTOR SHALL ADVISE ALL WORKERS IN THIS AREA OF THE POTENTIAL HAZARDOUS SITUATION.
- 3.1.7.** Contractor shall quote on renewing 20 sacrificial anodes in each sea bay and replacing with 20 x 10 lb anodes per sea bay, total of 40 anodes required. Contractor shall quote a unit cost per anode for adjustment purposes. Old anodes shall be removed before cleaning and painting. New anodes (CFM) shall be spot welded in place after paint has cured.
- 3.1.8.** Contractor shall mechanically clean 80 square meters in each of the two seabay internals to SSPC-SP3 or hand-tool clean SSPC-SP2. Before paint application, all surfaces shall be clean, dry and free of all contaminants including salt deposits. Surface preparation and paint application shall be to manufacturer's recommendations. All debris shall be removed prior to painting. A separate quote for unit cost per square meter for paint and preparation shall be included and adjusted by PWGSC 1379 action if different from the 80 square meters.

- 3.1.9.** Sea-bay internals and applicable surface areas shall be stripe coated before painting to ensure all hard to reach areas are coated. After striping, sea-bay internals shall be given 2 coats of Amerlock 2 of contrasting colours, with the final coat a light colour. Each coat shall be 5 to 8 mil D.F.T.
- 3.1.10.** Contractor shall supply all ventilation to ensure the complete drying of the first and second coats and also to protect against condensation and humidity.
- 3.1.11.** On completion of all work, sea bays shall be inspected by Chief Engineer & ABS prior to closing up. Manhole covers shall be securely refitted after final inspection. Contractor shall supply and fit new 1/4" neoprene gaskets (CFM) on all manhole covers and apply anti-seize compound to all securing studs.
- 3.1.12.** All ventilation equipment and materials required to carry out above work shall be provided by the Contractor.
- 3.1.13.** Bilge area at tank top level in these areas shall be left in "an as clean as found" condition on completion of the work.

3.2 Location

- 3.2.1.** Suction Sea Bay Frame 99 – 102, Double Bottom
- 3.2.2.** Discharge Sea Bay Frame 102 – 105, Double Bottom

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer & ABS.
- 4.1.2.** ABS Hull surveyor shall inspect the spaces before coatings are applied.

4.2 Testing N/A

4.3 Certification N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor is to provide a written report to the Chief Engineer detailing the information of the work performed with this item.

5.2 Spares
N/A

5.3 Training
N/A

5.4 Manuals
N/A

Spec item #: HD-06	SPECIFICATION	TCMSB Field #: N/A
Marcelo Anodes Anti Fouling / Anti Corrosion		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to perform maintenance on the impressed current anodes system for the vessel's seawater cooling system. Install new control panels for the anodes. Work shall be done under the supervision of EMCS Industries, Sydney British Columbia.
- 1.2** This work shall be carried out in Conjunction with the following:
 - Seabox and Seabay Maintenance

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Service Manual – Marelco Anti Fouling Impressed Current Seaboxes and Seabays
- 2.1.2.** Electrolytic Protection Drawing # 68-00-02

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1.** Canada Shipping Act.

2.4 Owner Furnished Equipment

- 2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1. Contractor to allow \$15,000.00 in the bid cost for the services of the sub-contractor in addition to the cost of contractor's own work. Final cost shall be adjusted upon proof of invoice from the service provider by 1379 procedure.
- 3.1.2. New anodes and control panels shall be installed under the direction of a Marelco representative. The Marelco representative shall be arranged for by the Contractor. The suggested Marelco representative shall supervise installation and commissioning of the new anodes. The sub-contractor shall be arranged for two separate visits, one for the installation and one for the commissioning aft refloating the vessel.
- Contact: Trevor Tasker
ECMS Industries (Marelco)
E: ttasker@emcsindustries.com
Commercial: www.emcsindustries.com |
T: 250.656.5366 ext 206 | C: 604.816.8881 | F: 250.656.5344 |
Unit 2, Martman Industrial Park, 2042 Mills Rd W, Sidney, BC, V8L 5X4, Canada
- 3.1.3. Contractor shall inspect and replace designated Marelco system anodes located in the sea boxes and sea bays. Contractor shall replace all 24 anodes – 14 copper, and 10 aluminum.
- 3.1.4. New anodes (GSM) will be CCG supplied. All anodes shall have watertight glands repacked.
- 3.1.5. New Marelco anodes are fitted in the following locations:
Port Seabox: 5 Copper, 5 aluminium
Starboard Seabox: 5 copper, 5 aluminum
Suction sea bay: 1 copper
Discharge sea bay: 3 copper
- 3.1.6. All anode cables and new anodes shall be tested for continuity before starting work and after replacement. Coast Guard will electrically isolate system before any work is started. Prior to the removal of any anode, the cables terminated within the anode safety cap shall be mechanically disconnected – **NOT CUT**. Connections shall presently be bolted together.
- 3.1.7. All Marelco system anodes removed shall be stored on the ship in a location as directed by Chief Engineer. NOTE: Contractor shall remove the port & starboard seabay vent pipes for access to some of the port & starboard seabox anodes.

- 3.1.8.** Prior to installation of new anodes, the mounting surface shall be cleaned completely of any corrosion and dirt and dried to ensure a watertight seal. The anodes shall be installed as per mounting instructions attached and at the direction of the service representative. The mounting bolt on each anode shall be torqued to a minimum value of 100 ft-lbs.
- 3.1.9.** Electrical connection of the anode lead and control power cable is with a nut and a bolt. Connections shall be tight and clean. A suitable compound electrical tape shall be used to bind the connection with a final binding of vinyl electrical tape to ensure waterproof integrity.
- 3.1.10.** After any defective cable shall removed and before any new cabling is installed, the Contractor shall air test the conduit piping to ensure the conduit pipe to the anode terminal box is watertight. Air testing shall be carried out at the kick plate connections for the anodes located aft of the DG sets in the Forward Upper Machinery Compartment. After new cabling has been installed, Contractor shall quote on pumping 5 kg of Vaseline into conduit piping through grease fittings on the kick plate connections.
- 3.1.11.** New owner supplied o-rings, 2 per anode, shall be installed in the replaced anode safety caps. Contractor shall fill the safety caps with a silicone, non-conducting grease (CFM) upon completion of all work. Suitable anti-seize compound shall be used on the threads of safety caps prior to installing and tightening.
- 3.1.12.** The two existing control panels, one port and one starboard, shall be removed from the supporting bracket and laid aside for CCG personal. The cabling shall be disconnected from the panels and identified by labelling each conductor. The two new panels shall be installed to existing brackets and the wires reconnected under the supervision of the FSR.
- 3.1.13.** System shall be calibrated by service representative after power has been restored when the vessel is re-floated.
- 3.1.14.** Note: See cleaning of sea boxes and sea bays and for replacement of sacrificial anodes during this work, also for the required marine chemist certificates for confined space entry and hot work.
- 3.1.15.** Chief Engineer shall receive three (3) type written copies of report from service engineer for work carried out on this system.

3.2 Location

- 3.2.1.** Port and Starboard Seaboxes
- 3.2.2.** Forward and Aft Seabays

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer, ABS and the FSR for the specified work.

4.2 Testing N/A

4.3 Certification N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Chief Engineer shall receive three (3) type written copies of report from service engineer for work carried out on this system.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: HD-07	SPECIFICATION	TCMSB Field #: N/A
Cathelco ICCP Hull Protection System		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to replace all 10 anodes and 4 reference cells for the hull impressed current system. The services of an authorized Cathelco representative shall supervise the work and provide guidance for repairs.
- 1.2 This work shall be carried out in Conjunction with the following:
 - Underwater hull coating repair.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1. Wilson Walton Service Manual And Drawings

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT

2.3 Regulations

- 2.3.1. Hull and Construction Regulations

2.4 Owner Furnished Equipment

- 2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. Owner will supply new anodes and reference cells.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The contractor shall allow \$10,000.00 in its bid for the subcontracted services as well as travel and living, in addition to the cost of the contractor's own work. This shall be adjusted by 1379. The work of this item will require opening up and certifying gas free tanks and spaces identified under the location heading of this spec.
- 3.1.2.** All work dealing with the anodes including installation shall be done under the direction of a Cathelco representative. Cathelco representative shall be arranged for by the Contractor and payment of any costs incurred for this requirement shall be paid by the contractor and included in the known work. The suggested Cathelco representative shall supervise installation of the new anodes is as follows:
Jastram Technologies
Technical Support
Ph: 902-468-6450
Fax: 902-468-6901
- 3.1.3.** Contractor shall open up all 14 cofferdams and remove the Vaseline from each cofferdam. All cables shall be disconnected at the cofferdams or nearby junction boxes. The anodes and reference cells shall be removed from the hull and discarded. The cable glands shall be removed from the hull penetration and the cofferdams conduit branch. New cable glands sized to suit the cables shall be installed.
- 3.1.4.** All 10 elliptical anodes shall be removed from the hull and discarded. Contractor shall allow for repairing and or replacing 25% of the damaged studs. Drill and tap new stud holes to match the bolt pattern of the new anodes. Allow for 4 holes per anode.
- 3.1.5.** The Dielectric shield areas, out to a 3 meter radius from the anodes shall be Abrasive Blasted to SSPC-SP 10 Near White Blast Cleaning. The area shall be built up with Intergard 822 epoxy compound, 6 mm thick at the anodes to 1mm thick at the edge. Special surface preparation and coating behind the anode shall be as specified by the FSR. **Refer to Hull Inspection spec for coating requirements in and around the anodes.** The new anodes shall be seated in the epoxy coated during application. The application shall be applied before the anti corrosive and anti fouling paint. It's important to ensure that anodes and reference electrodes are completely covered with plywood during high-pressure water washing, grit blasting and painting operations. Contractor shall supply and install Intergard 822 epoxy filler around the ten (10) hull anodes and fair to contour specified by the FSR.
- 3.1.6.** The four reference cells shall be removed from the hull recess. The recesses shall be thoroughly cleaned. The new reference cells shall be installed and the area around the cells shall be filled with Intergard 822 epoxy filler flush with the hull plating.

Other Required Work

- 3.1.7.** Access to shaft tunnels for reference electrodes is via hatches in Mud Compartment. This is not considered a confined space, however hot work restrictions apply.
- 3.1.8.** All ten anodes and four reference cells shall have hull anode cofferdam flange covers removed. Vaseline shall be cleaned from cofferdams. All watertight glands shall be inspected for possible leakage.
- 3.1.9.** All cabling and anodes shall be meggered tested. Leads shall be re-connected to anodes/electrodes and cables and anodes/electrodes checked for continuity. Leads shall be re-connected to power supply. The ships Electrical Officer shall witness the megger readings.
- 3.1.10.** Before the cofferdams are filled with Vaseline, the vessel must be floated to check for leaks and prove all glands are tight.
- 3.1.11.** Upon completion of inspection and above work, all cofferdams shall be filled with Vaseline. Contractor shall quote on supplying and installing 40 KG of Vaseline to fill the cofferdams when the work is completed.
- 3.1.12.** Cofferdam flange covers shall be installed using new neoprene gaskets and fasteners (both CFM). All nuts and bolts shall be coated with anti-seize compound.
- 3.1.13.** All staging (including staging in the dock for anode/electrode external inspection) equipment, lighting, ventilation equipment, tools shall be Contractor supplied.
- 3.1.14.** Chief Engineer to receive three (3) type written copies of report from service engineer and work carried out on this item.
- 3.1.15.** All work shall be completed to the satisfaction of ABS and Chief Engineer.

3.2 Location

- 3.2.1.** Location of anodes and reference electrodes is as follows:
- 3.2.2.** Anodes #'s 1 & 3 Frame 121, starboard
- 3.2.3.** Anodes #'s 2 & 4 Frame 121, port
- 3.2.4.** Anode # 5 Frame 60, starboard
- 3.2.5.** Anode # 6 Frame 60, port
- 3.2.6.** Anodes #'s 7 & 9 Frame 30, starboard
- 3.2.7.** Anodes #'s 8 & 10 Frame 30, port
- 3.2.8.** Reference electrodes a & b Frame 108, port & starboard
- 3.2.9.** Reference electrodes c & d Frame 45, port & starboard
- 3.1.16.** Cofferdams for the above anodes & electrodes are located inside the following tanks:
 - # 2 wing water ballast tanks, port and starboard, Frames 105 – 123
 - # 3 double bottom water ballast tanks, port & starboard, Frames 48 – 60
 - Shaft tunnel voids, port & starboard, Frames 27 – 33
 - Shaft tunnels, port & starboard, Frames 44 – 45

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of all interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer, ABS and the FSR for the Impressed Current System.

4.2 Testing

As required by ABS & Chief Engineer.

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Chief Engineer shall receive a typed written report in electronic format from Cathelco Service Representative for work carried out on this system.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: HD-08	SPECIFICATION	TCMSB Field #: N/A
Fuel Tank #2 DB Port & Stbd Cleaning / Inspection / Testing		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to open; gas free and clean the identified tanks suitable for ABS inspection. Tanks shall be credited for a five year survey.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Tank Capacity Plan # T13-1027
- 2.1.2.** 07-07-04_05 FR 1,2, 3 Double Bottom Unit Fr 60- 79
- 2.1.3.** 07-07-06_07 FR 1,2, 3 Double Bottom Unit Fr 80-99 P&S
- 2.1.4.** 07-00-03 FR 1& 2 Tank Top

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1.** Transport Canada Hull Construction Regulations.

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. The following tanks are to be addressed as per this specification;

- No 2 Double Bottom Stbd 127 m3 Fr 60 – 94
- No 2 Double Bottom Stbd 127 m3 Fr 60 - 94

3.1.2. The Chief Engineer will advise the Contractor which tanks are available for cleaning to allow adequate time for ships staff to transfer fuel. The tanks will be pumped as low as possible.

3.1.3. # 2 Fuel Oil DB tanks are located under the main engines. Accessibility in these tanks is difficult as the tanks are only 1.1 meters high with exception of the outboard, forward and aft section. Each tank is fitted with six manhole covers to assist in accessibility.

3.1.4. Contractor shall quote for the removal and disposal of estimated 3 m³ of oil/sludge for each tank. The disposal of all residues from the tanks must be by a licensed waste oil disposal company. The total amount of residue, excluding residue from water washing of tanks, shall be totaled and amount given to Chief Engineer. Contractor shall supply the name of the collection and disposal company to the Chief Engineer. Contractor shall quote unit cost for removal and disposal of 1 m³ of oil/sludge for PWGSC 1379 adjustment. Contractor shall provide an accurate means of measuring the removed residue through the use of flow meters or tank sounding devices.

3.1.5. Contractor shall supply all ventilation and lighting equipment required for the Hot-Work certificates and maintain the equipment for the duration of the work. Gas-free/Hot-Work certificates shall be renewed as required. Contractor shall quote a unit cost to gas-free a fuel oil tank for PWGSC 1379 adjustment.

3.1.6. Contractor shall remove manhole covers for access to tanks and install covers in good order after the final inspection by the Chief Engineer. All dirt and debris found in tanks shall be removed ashore and disposed of by Contractor to an approved location.

3.1.7. The tank internals are to be 100 percent high pressure washed at 3000 psi minimum. All water and residue from tank washing shall be pumped ashore and disposed of by Contractor. Tanks shall be thoroughly wiped down with lint-free clean rags and all sludge deposits scraped off and disposed. During the water washing process, contractor will take care not to direct a stream of water at a tank's level transducer. Each level transducer is located at Frame 77 centerline the level transducers must be covered up prior to any water washing of the tank.

3.1.8. After cleaning and removal of all rags, debris, Contractor shall arrange with ABS for inspection and inform Chief Engineer prior to their arrival.

3.1.9. Contractor shall remove protective covers from the level transducers.

3.1.10. After tank cleaning is completed, while gas-free certificate is still valid, CCG personnel will be inspecting tank gauging level sensors in tanks. After sensors are inspected, CCG will advise Contractor when tanks can be closed up.

- 3.1.11.** Tanks shall be tested with air pressure at 1.5 PSI by Contractor to the satisfaction of the attending ABS Surveyor. All tests shall be witnessed by the Chief Engineer as well as the ABS surveyor. The quote shall include the installation and removal of blanks/balloons for suctions, sounding pipes, overflow pipes with check valves, vent head removal and additional tank entries for subsequent balloon/blank adjustments. Contractor shall advise Chief Engineer prior to reinstalling manhole cover after successful pressure test so that the Chief Engineer may view the tank.
- 3.1.12.** Before any tank is closed up, the manhole covers shall be inspected by the Chief Engineer. All tank fasteners shall be wire brushed clean and coated with an approved anti-seize compound. Contractors shall include in quotation to supply and install new ¼ inch thick neoprene gaskets for replacement on all 12 covers. The center of the gaskets inside the bolted flange surface shall be cut out.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

All work shall be completed to the satisfaction of the Chief Engineer & ABS.

4.2 Testing

All testing shall be witnessed by ABS and Chief Engineer.

4.3 Certification

Certified Chemist to Gas free tanks.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out on these tanks.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: HD-09	SPECIFICATION	TCMSB Field #: N/A
Seabox Maintenance		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to open the port and starboard sea boxes for cleaning, coating repair, and ABS inspection. Contractor shall ensure marine chemist certificates for these areas for confined space entry and hot-work are obtained and kept valid as per the Coast guard Fleet Safety manual.
- 1.2 This work shall be carried out in Conjunction with the following:
 - Bubbler Piping Inspection
 - Sea Valve Maintenance
 - Seawater Impressed current anode system

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1. Port Sea Box Volume 70 m³
- 2.1.2. Starboard Sea Box Volume 70 m³
- 2.1.3. Tank Capacity Plan Drawing # T13 1027
- 2.1.4. Shell Expansion

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT
- 2.2.9. (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10. (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

2.3.1. Hull Construction Regulations CSA

2.4 Owner Furnished Equipment

2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** Cleaning of sea boxes is not to be carried out until the completion of hull pressure washing and hull grit blasting, unless suitable internal protection is provided.
- 3.1.2.** Access to sea boxes is by removal of manhole covers located on the Main Deck: port sea box manhole which is located in the Incinerator Compartment (frame 100 port); starboard sea box manhole cover is located in the starboard engine room entrance, forward of the day tank (frame 100 starboard).
- 3.1.3.** Each sea box comprises an inner and outer sea box with a longitudinal division plate extending vertically 3/4 the height of the compartment.
- 3.1.4.** All inlet grids and internal sea box and sea bay surface areas shall be thoroughly cleaned by high pressure fresh water washing to remove all loose scale, paint, marine growth etc. Debris from this cleaning shall be removed from ship and disposed of ashore on a daily basis.
- 3.1.5.** Grid holes in shell and all manhole covers shall be cleaned by hydro-blasting or reaming using a close fitting drill. Diameter of each grid hole perforation is 25 mm.
- 3.1.6.** Upon completion of fresh water pressure washing and disposal of debris from the sea boxes and sea bays, Contractor shall arrange for inspection with Chief Engineer and ABS.
- 3.1.7.** In each outer sea box lower area as designated by the Chief Engineer, Contractor shall renew the remaining 8 fitted sacrificial anodes four (4) x 40 lb. sacrificial anodes in each outer sea box. Total of eight x 40 lb. anodes shall be replaced.
- 3.1.8.** IMPORTANT: The aft bulkhead in each sea-box at frame 99, port & starboard sides, is contiguous with tanks containing fuel oil. CONTRACTOR SHALL ENSURE THERE IS NO BURNING OR WELDING CARRIED OUT ON THESE BULKHEADS. CONTRACTOR SHALL ADVISE ALL WORKERS IN THESE AREAS OF THE POTENTIAL HAZARDOUS SITUATION.
- 3.1.9.** Contractor shall quote on mechanically cleaning and painting 50 m² in each sea box internal surfaces (100 m² Total), including bubbler pipe-work passing through sea boxes, suitable for application of two (2) coats of Amercoat 339 coating. Surface preparation and paint application shall be to manufacturer's recommendations. Power-tool clean to SSPC-SP3 or hand-tool clean SSPC-SP2. Before paint application, all surfaces shall be clean, dry and free of all contaminants including salt deposits. The contractor is advised that any over-millage condition will result in improper curing and subsequent potable water contamination. The contractor shall quote a unit cost for preparation and coating per one m² for 1379 PWGSC adjustment purposes.

- 3.1.10.** When mechanical scaling and cleaning is being done, a temporary cover for each sea-box manhole cover shall be fitted by Contractor. During this cleaning Contractor will install an extraction fan on each sea-bay inlet grid or sea-box ventilation pipe to create a negative pressure in the sea-box to prevent dirt & debris from the mechanical cleaning from entering the Incinerator Compartment or the Engine Room change area as applicable. The following pipe outlets in each sea-box shall also be temporarily covered to prevent the ingress of dirt & debris during scaling & cleaning operations: main suction, inner & outer sea-box discharges, evaporator brine overboard, fire monitor inlet.
- 3.1.11.** Contractor shall follow paint manufacturer's recommendations for surface preparation, application and curing are strictly adhered to.
- 3.1.12.** On completion of all work, sea boxes shall be inspected by Chief Engineer prior to closing up. Manhole covers shall be securely refitted after final inspection. Contractor shall supply and fit new ¼" neoprene gaskets (CFM) on all manhole covers and apply anti-seize compound to all securing studs.
- 3.1.13.** All staging, ventilation equipment and materials required to carry out above work shall be provided by Contractor.
- 3.1.14.** All equipment in the Incinerator Compartment, starboard Engine Room casing entrance and passageways through Winch Compartment shall be protected against dirt and damage during the time this work is in progress. These areas shall be left in "an as clean as found" condition on completion of the work.

3.2 Location

- | | | |
|---------------|-------------------|----------|
| 3.2.1. | Port Sea Box | 99 – 105 |
| 3.2.2. | Starboard Sea Box | 99 – 105 |

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer.
- 4.1.2.** ABS Hull surveyor shall inspect the spaces before coatings are applied.

4.2 Testing N/A

4.3 Certification N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: HD-10	SPECIFICATION	TCMSB Field #: N/A
Port Sterntube Strut Permanent Repair		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to inspect and test the weld repair on the inboard side of the port sterntube strut and the covering plate on the outboard side.
- 1.2** The contractor shall obtain the services of a weld inspection authority to test the weld repair.
- 1.3** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Skeg IWO Shaft Brackets # 07-12-10_11, 8 sheets

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT

2.3 Regulations

- 2.3.1.** Canada Shipping Act.

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** Contractor shall provide man-lift equipment or scaffolding to access the port sterntube strut for testing, inspection, and preparation work.
- 3.1.2.** Coatings shall be power tooled cleaned IWO weld repairs. Allow for 3 linear meters and 100mm beyond the weld extents and 100mm each side of the welds. Welds shall be cleaned to allow for UT and MPI tests.
- 3.1.3.** ABS and Chief Engineer shall inspect the welds and witness the tests.
- 3.1.4.** Following the results from the testing and inspection, ABS will determine how we proceed.
- 3.1.5.** The damaged coating areas shall be prepared for the application of the International Inerta coating. Damaged areas shall be coated with the Inerta System.

3.2 Location

- 3.2.1.** Bossing plate port side (approx. Frame 13.5-16.5 inboard side)
- 3.2.2.** Bossing connection to tube port side (approx. Frame 22) 4
- 3.2.3.** Closing plate port side (approx. Frame 19-21 outboard side)

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing N/A

4.3 Certification N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out.

5.2 Spares
N/A

5.3 Training
N/A

5.4 Manuals
N/A

Spec item #: E-01	SPECIFICATION	TCMSB Field #: N/A
SS Generator Diesel Fuel Supply & Return Modification		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to separate the common fuel supply and return pipes to the port and starboard generator diesels. Install an additional supply and return pipe to the Generator Fuel Oil Head Limiting tank to allow the port and starboard diesels to have individual supply and return pipes.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Toromont Cat – D/G Set D.O. Head Limiting Tank # 091460M102
2.1.2. Toromont Cat – Diagram of D/G Set F/O System Piping # 091460M107

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
2.2.4. Coast Guard ISM Hotwork procedures
2.2.5. Coast Guard ISM Fall Protection procedures
2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
2.2.7. CWB CSA 47.1 latest revision Division I, II or III
2.2.8. SSPC-SPT
2.2.9. (a) TP 127E-TC Marine Safety Electrical Standards.
2.2.10. (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1.** Canada Shipping Act.

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The fuel in the tank will be drained to the drain level by the ship's crew.
- 3.1.2.** The fill valves shall be isolated and locked out. The generator diesels shall be locked out.
- 3.1.3.** The tank shall be opened up by the top manhole cover. The tank internals shall be cleaned and gas freed for hotwork. The tank is fitted with a float valve assembly.
- 3.1.4.** The existing arrangement has one supply connection and one return connection to the starboard side of the head limiting tank. One additional supply and return connection shall be fitted to the same side of the tank. A penetration shall be made to fit 1 inch diameter schedule 40 steel pipe for the new supply, 4 inches up from the bottom of the tank, 3 inches aft from the forward side of the tank. The pipe shall pass through the tank side and to be welded inside and outside the tank wall. A slip-on weld flange shall be fitted to the end of the pipe to give a 3 inch distance from the face of the flange to the tank wall. A 1 inch diameter quick closing valve (CCG Supplied) shall be fitted to the new supply flanged connection.
- 3.1.5.** A penetration shall be made to fit a 1 inch diameter half coupling, 3000#, SCRD, 3 inches down from the top of the tank and 3 inches forward from the aft side of the tank. The half coupling shall pass through the tank wall and to be welded inside and outside the tank.
- 3.1.6.** Two deck penetrations shall be cut in the deck of the generator flat to allow the new supply and return pipes to pass through. The penetration collars shall be fitted with compensation collars and welded below and above the deck. The location shall be starboard of the head limiting tank adjacent to the existing supply and return pipes.
- 3.1.7.** The existing supply and return pipes shall be cut at the Tee branches near the deck head of the Lower Forward Auxiliary Machinery Compartment over the sewage treatment tank starboard side. The existing supply and return pipes shall be reconnected to the port SS generator pipes with socket weld couplings and elbows. New supply and return pipes shall be installed from the existing pipes aft of the tee branches of the starboard SS generator. The new pipe runs shall follow the existing pipes and run forward and up to the head limiting tank. Each new run is approximately 16 feet. The new pipe runs shall be connected with socket weld fittings. The new supply pipe connection at the tank shall be fitted with a slip-on welded flange for connection to the quick closing valve. The new return pipe connection at the tank shall be threaded.

- 3.1.8.** All new piping shall be 1 inch diameter, seamless black steel, schedule 40, ASTM A-106 Gr B Spec or equivalent.
- 3.1.9.** All pipe fittings and joints shall be 200 bar forged steel, socket weld, ASTM A 105 spec, unless otherwise noted.
- 3.1.10.** All piping materials, workmanship and testing shall be in accordance with the rules and regulations of ABS and Transport Canada.
- 3.1.11.** All new and modified piping shall be pressure tested after completion to 1.5 times the working pressure.
- 3.1.12.** All piping shall be suitably supported by pipe hangers. A sufficient number of union take down joints shall be installed for ready access and/or removal.
- 3.1.13.** All new and modified piping runs shall be flushed and blow-out after installation and tested to insure that they are clean and free of foreign materials and debris prior to start up.

3.2 Location

- 3.2.1.** Generator Flat 6000 A/B Starboard of CL, Frame 121-123
- 3.2.2.** Lower Forward Auxiliary Machinery Compt. Starboard of Sewage Treatment Tank Frame 112-122

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer & ABS.

4.2 Testing

Fuel Oil Head Limiting Tank shall be pressure tested to 2 psi. Blanks shall be fitted to all penetrations. Float valve assembly shall be removed if deemed necessary to prevent damage to the valve.
Piping shall be tested as specified.

4.3 Certification

Piping / Fittings certificates to be supplied to Chief Engineer.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out.

5.2 Spares
N/A

5.3 Training
N/A

5.4 Manuals
N/A

Spec item #: E-02	SPECIFICATION	TCMSB Field #: N/A
Safety Valve Re-certification		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to have 55 safety valves recertified for ABS. Valves will be removed and reinstalled by ships crew.
- 1.2 This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1. List of Valves:

Tag	Serial #	Pressure	Size
# 2 Service Air Comp 1 st Stage	NV4787	60 PSI	¼" NPT
# 2 Service Air Comp Discharge	NV0396	150 PSI	1" NPT
# 2 Start Air Comp 2 nd Stage	NV2168	33 BAR	¾" BSP
# 2 Start Air Comp 1 st Stage	NV2166	6.6 BAR	1 ¼" BSP
Emergency Air Comp 1 st Stage	NV2156	60 PSI	¼" NPT
Emergency Air Comp 2 nd Stage	NV2160	260 PSI	¼" NPT
Emergency Air Comp 3 rd Stage	NV37826	1300 PSI	¼" NPT
Whistle Buffer Tank	NV2151	100 PSI	1" NPT
Main Eng 1&2 Buffer Tk (Clutch)	NV3714	115 PSI	1" NPT
Main Eng 3&4 Buffer Tk (Clutch)	NV2152	115 PSI	1" NPT
Main Eng # 1 Control Air Rec.	NV2155	120 PSI	¾" NPT
Main Eng # 2 Control Air Rec.	NV2154	120 PSI	¾" NPT
Main Eng # 3 Control Air Rec.	UV7809	120 PSI	¾" NPT
Main Eng # 4 Control Air Rec.	UV7808	120 PSI	¾" NPT
Main Air Bottle FWD	NV24348-2	430 PSI	1" NPT
Main Air Bottle AFT	NV24348-1	430 PSI	1" NPT
# 1 Start Air Comp 1 st Stage	NV23312	6.6 BAR	1 ¼" BSP
Domestic Hotwater Tank	NV59610	101 PSI	1 ½" NPT
# 1 Start Air Comp 2 nd Stage	NV2167	33 BAR	¾" BSP
Winch Control Bottle FWD	NV2171	120 PSI	3/8" NPT
Winch Control Bottle AFT	NV2172	120 PSI	3/8" NPT
M/E Clutch Air Reducing Station	NV2162	105 PSI	¾" NPT
Whistle Reducing Station	NV2150	105 PSI	¾" NPT
M/E Control Air Reducing Station	NV2169	100 PSI	¾" NPT
# 1 Service Air Comp 1 st Stage	NV2231	60 PSI	¼" NPT
# 1 Service Air Comp Discharge	NV2235	145 PSI	1" NPT
# 1 Service Air Bottle	NV00397	145 PSI	1" NPT
F/O Quick Closing Valve System	NV4184	110 PSI	¼" NPT

F/O Quick Closing Valve System	NV4185	110 PSI	¼" NPT
Deicing/SW Valve Red. Station	NV02551		
Bunker Pipeline	159306.020-1		
Fuel Oil Cargo Pump Relief	C-24257-A10		
No 1 ME Air Start Valve Relief	NV 5136		
No 2 ME Air Start Valve Relief	NV 3512		
No 3 ME Air Start Valve Relief	NV 5137		
No 4 ME Air Start Valve Relief	NV 5135		
No 1 ME Jacket Water Heater	NV 5130		
No 2 ME Jacket Water Heater	NV 5131		
No 3 ME Jacket Water Heater	NV 5134		
No 4 ME Jacket Water Heater	NV33728		
Hot Water Tank Relief	NV833590		
SS Gen Start Air Reducing Station	NV02824	150 PSI	1" NPT
Domestic FW System Tank	NV 5914		
Spare	NV 5604		
Spare (Vidmars)	NV3712	115 PSI	1" NPT
Spare (Vidmars)	NV3713	115 PSI	1" NPT
Spare (Vidmars)	NV3711	15 PSI	¾" NPT
Spare	NV4786		
Spare	NV0114		
Spare	NV5155		
Spare	NV2163		
Spare	NV2170		
Spare	NV5911		
Spare	NV5912		
Spare	NV5915		
Spare	SB90513		

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** NIST and NRC
- 2.2.10.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.11.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

2.3.1. Marine Machinery Regulations - CSA

2.4 Owner Furnished Equipment

2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. The above valves shall be transported to an authorized valve testing facility for service, testing, and recalibration. The valve shall be in sent in two deliveries to allow the service air to remain in service during the work. The first delivery will be all valves with the exception of 3 valves, which shall be sent in the second delivery.

3.1.2. The valves shall be returned to the vessel for installation by the ships crew.

3.1.3. An allowance of \$10,000.00 shall be quoted for the sub-contractor work and adjusted by 1379 procedure following receipt of invoice.

3.2 Location

3.2.1. Various areas of the vessel.

3.3 Interferences

3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer & ABS.

4.2 Testing

As specified by NIST

4.3 Certification

As specified by NIST

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Original certificates for the recertification shall be given to the Chief Engineer.

- 5.2 Spares**
N/A
- 5.3 Training**
N/A
- 5.4 Manuals**
N/A

Spec item #: E-03	SPECIFICATION	TCMSB Field #: N/A
Stbd RO Suction Pipe Replacement		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to replace the 3" Ø suction pipe from the fire pump suction to the existing flange connection aft of watertight door frame 98-99, lower engine room. Also replace a Tee branch to the direct sea suction.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1.

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT

2.3 Regulations

- 2.3.1.** Canada shipping Act.

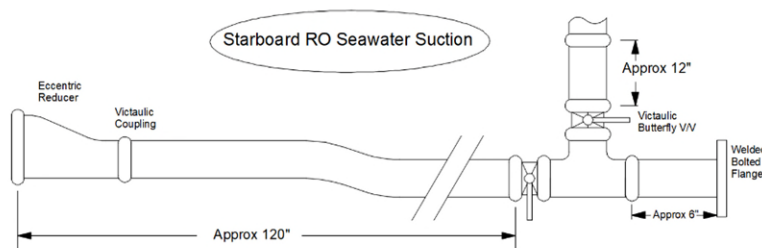
2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1. The contractor shall remove the section of piping from the Fire Pump main suction at the eccentric reducer, the direct suction branch at WT bulkhead 99, and the bolted flange leading to the RO pump suction. See below sketch for reference.
- 3.1.2. The four sections shall be fabricated with schedule 80 steel pipe, hot dipped galvanized. The pipe ends shall be grooved for Victaulic groove lock coupling style 75. One end of the short section shall have a bolted flange fitted. The sealing surface of the grooved ends shall have the galvanized dressed smooth to allow the Victaulic seals to seat tight.



- 3.1.3. The Victaulic Tee shall be replaced with new and hot dipped galvanized. The Victaulic Valves shall be replaced with new if deemed necessary. The contractor shall have an allowance of \$2000.00 for fittings, seals, and valves. This shall be adjusted by 1379 following proof of invoice.
- 3.1.4. The pipe sections shall be reassembled as originally found. The pipe brackets shall be reused and secured.

3.2 Location

- 3.2.1. Frame 98-99 Lower Engine Room Port of Centerline

3.3 Interferences

- 3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1. All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

The pipe assembly shall be tested to ensure there are no leaks.

4.3 Certification

Pipe certificates shall be supplied to the Chief Engineer.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: E-04	SPECIFICATION	TCMSB Field #: N/A
Main Engine Lube Oil Coolers Inspection		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to open up the four main engine lube oil coolers for cleaning, inspection, and testing and obtain a five year credit for the survey by ABS.
- 1.2 This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1. Manufacturer: NRF Thermal Engineering BV Holland
Cooler Type: H2P 2900 x 10 -2-CAS
Serials #s: 82-0291-1, 2, 3, 4
Drawing #: 4DF21-2
Dry Weight: 1251 kg
Length With End Boxes – 3.529 meters
Diameter – 570 mm
Test Pressure Tube Side: 9 bar
Test Pressure Shell Side: 12 bar
- 2.1.2. Machinery Arrangement # 60-00-01 Rev 5
- 2.1.3. NRF Lube Oil Cooler Drwg. # 4DF21-2

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT

2.3 Regulations

- 2.3.1. CSA Marine Machinery Regulations

2.4 Owner Furnished Equipment

- 2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The valves shall be isolated from the coolers. The water and oil shall be drained from the coolers and contained for disposal. All parts shall be marked for alignment purposes during reassembly.
- 3.1.2.** The cooler tube nests shall remain in the shell for cleaning.
- 3.1.3.** The 5 inch Ø oil and water pipes from the coolers to the isolation valves shall be removed and marked for alignment purposes during reassembly. Blanks are to be fitted to the system piping immediately upon part removal to prevent ingress of debris.
- 3.1.4.** The end covers of the coolers shall be removed and identified for correct reassembly. The o'ring gland rings shall also be removed. The oil side inlet and outlet ports shall be left open for inspection purposes only, then closed up to prevent the ingress of dirt..
- 3.1.5.** The coolers are mounted vertically and fastened with horizontal pedestals.
- 3.1.6.** The cooler tubes shall be thoroughly cleaned internally with a soft brush and flushed with water to remove loose debris. Cleaner shall be ZEP Formula 9862. Wire brushes and high pressure steam is **not** permitted for cleaning. All sealing surfaces shall be cleaned to accept new gaskets and O-Rings.
- 3.1.7.** The internals of the coolers shall be inspected through the oil ports and tube ends by ABS attending surveyor.
- 3.1.8.** The coolers shall be reassembled using owner supplied gaskets and O-Rings.
- 3.1.9.** The coolers shall be air tested at specified test pressure on both the shell side and tube side. Pressure must be maintained for a minimum of one hour. The contractor shall provide all fittings, blanks, and test equipment to perform the tests. The pressure gauge shall have a current calibration certificate and a copy of the certificate shall be given to the Chief Engineer. The test shall be witnessed by ABS and the Chief Engineer.
- 3.1.10.** All removed piping shall have their sealing surfaces cleaned and new contractor supplied gaskets installed. The oil pipes are bolted flange connections and the water is Victaulic groove-lok. Allow for thirty 5 inch Victaulic gaskets to be replaced. Gaskets are style 75/77 and must be compatible with DEWT cooling water treatment.
- 3.1.11.** Following the successful completion of the test the coolers shall be completely reassembled as originally found. The contractor is to take precautions to ensure cleanliness for the reassembly of the oil system. The Chief Engineer will be responsible for charging and flushing the oil side of the coolers prior to checking for leaks. The water and oil shall be circulated through the coolers to check for leaks.

3.2 Location

- 3.2.1.** Frame 90-94 Engine Room Flat

3.3 Interferences

3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

All work shall be completed to the satisfaction of the Chief Engineer & ABS.

4.3 Testing

As specified in the technical description.

4.3 Certification

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: E-05	SPECIFICATION	TCMSB Field #: N/A
PTO Clutch Survey		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to open up the Port and Starboard Power Take-Off (PTO) clutches for the 5 year survey by ABS under the supervision of an authorized representative for the clutch. Contact is Kevin Sanford, Service Manager at Bosch Rexroth in Dartmouth, Nova Scotia or Scott Whelan at Northpoint Technical Services, St. John's NL

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Manufacturer: Lohmann & Stolterfoht (Pneumaflex)
Type: KAA 180

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT

2.3 Regulations

- i.CSA - Marine Machinery regulations

2.4 Owner Furnished Equipment

The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1. The Contractor is to allow \$10,000 for the services, travel and living costs for the FSR. Allowance is to be adjusted up or down by 1379 action.
- 3.1.2. Both clutches shall be dealt with in the same manner. All replacement parts and seals are to be Coast Guard supply.
- 3.1.3. **Pre Removal:** The contractor shall remove the clutch guard surrounding the clutches as well as any necessary piping, wiring, etc to facilitate the removal of the clutch assembly.
- 3.1.4. The contractor shall measure and record the clutch drum travel in the ahead and astern positions as per the manufacturers' specifications.
- 3.1.5. Copies of the above readings shall be given to the Chief Engineer prior to continuing removal of the clutch.
- 3.1.6. The contractor shall ensure that all faces of the associated flanges and spacer plates are properly "proof" marked for subsequent re-assembly and correct orientation.
- 3.1.7. **Removal and Disassembly:** Remove the clutch to a location between the port and starboard gearboxes for disassembly. During disassembly of the clutch pack, the contractor shall ensure that all elements of the pack are proof marked for correct orientation during re-assembly.
- 3.1.8. Disassemble the clutch to clean and lay out the parts for inspection by the attending ABS Surveyor and Chief Engineer as follows. Separate the tapered jackets, separate the friction cones and spiroflex elements, disassemble the clutch cylinder and piston, and remove and discard the piston seals and the sealing cord.
- 3.1.9. The contractor shall remove the seal adapter located in the gearbox input shaft and inspect the spring and seals. The o'rings shall be replaced with new o'rings. The face seal shall also be replaced with a new seal.
- 3.1.10. **Cleaning and Inspection:** Thoroughly clean both tapered jackets and inspect them closely for heat cracks and discolouration. Lightly buff both sets of friction pads to remove any dirt, grease, oil, etc. and inspect them closely for wear and defects. Clean and inspect all fasteners for wear and defects.
- 3.1.11. Clean and inspect the four spiroflex elements for wear and defects. Clean and inspect the cylinder and piston, especially in way of the seal surfaces, for wear and defects.
- 3.1.12. The attending ABS Surveyor and Chief Engineer shall inspect the clutch components before re-assembly.
- 3.1.13. The contractor shall be responsible for arranging the attendance of the ABS Surveyor.
- 3.1.14. The contractor shall measure and record the torsional deformation "angle of twist" on the spiroflex elements as per the manufacturer's instructions.
- 3.1.15. **Re-assembly:** The contractor shall be aware that the torque on the long bolts with tapered necks is very low due to the grade of steel. These bolts hold the flexible elements together. The torque varies with the size of the bolts. The proper torque is specified in the instruction manual.

- 3.1.16.** Reassemble the piston and cylinder in good order using new seals and cord with the seals cemented in place with adhesive (owner supply) in accordance with the manufacturer's instructions. Reassemble the friction cones and spiroflex elements in good order. Reassemble the tapered jackets.
- 3.1.17.** All fasteners shall be torqued as per the manufacturer's specifications. All proof marks shall be checked. Reassemble any additional removals.
- 3.1.18.** The owners shall supply the seal kit for the clutches and the contractor shall supply all other material for the specified work.
- 3.1.19. Pre-Installation Testing:** Before the clutch assembly is installed the contractor shall pressurize it to 100 psi to demonstrate that all components are tight and that all seals are operating correctly. This test shall be carried out in the presence of the Chief Engineer. The duration of the test will be for one hour to the satisfaction of the Chief Engineer.
- 3.1.20. Re-Installation and Testing:** The contractor shall install the clutch ensuring correct orientation of associated flanges and spacer rings using the proof marks. All proof mark locations shall be verified. All fasteners shall be properly torqued.
- 3.1.21.** The contractor shall advise the Chief Engineer when the clutch is ready to be tested. The ship's crew will manually operate the clutch to check for correct operation and air leaks after installation with the contractor's personnel in attendance.
- 3.1.22.** The contractor shall record the clutch travel readings and alignment and present them to the Chief Engineer at this time.
- 3.1.23.** The contractor shall replace all guards, disturbed piping, wiring, and other removals in good order on completion of the above work.

3.2 Location

- 3.2.1.** Lower engine room

3.3 Interferences

- 3.2.1.** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

As per specified work

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor shall provide the Chief Engineer with a complete written report of the work completed by the FSR. All initial and final readings are to be included.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: E-06	SPECIFICATION	TCMSB Field #: N/A
Humidifier Drain Pipe Replacement		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to replace approximately 12 feet of drain pipe from the fan room to the Y connection port side of Winch Room near the deck head. Fabricate a rectangular funnel shaped drain pan.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1.

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT

2.3 Regulations

- 2.3.1.** TC Construction Regulations For Deck Penetrations

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** Remove section of piping that extends just starboard of the centerline to the port side of winch room at a “Y” connection for other drains. The pipe section is located above the tow wire tensioner and penetrates the deck head into the Fan Room located on the Focsle Deck (Blue Deck).
- 3.1.2.** Cropped deck penetration pipe into the Fan Room and install new pipe with Victaulic grooved ends. Deck penetration shall be welded on each side of the deck. The pipe that extends in the fan room shall be as low as possible to fit a Victaulic coupling and the drain pan, the drain pan height is limited to allow drains from the humidifiers.
- 3.1.3.** Install new section of pipes from the penetration in the fan room across the winch room and reconnect to the Y connection. The piping is in two sections, one approximately 10 feet and another approximately 2 feet in length. All pipe connections are Victaulic grooved.
- 3.1.4.** A Stainless Steel drain pan shall be fabricated. Pan shall be 16 inches by 8 inches, 4 inch vertical sides with the bottom sloped to a 2 inch diameter drain. The plate thickness for the drain pan shall be 1/16 inches. The location of the drain in the bottom of the pan shall be determined on site for correct fitment. The end of the drain pipe shall be grooved for Victaulic seal and coupling. The drain pan shall be supported to the deck with two sections of vertical SS flat bar welded to the deck.
- 3.1.5.** All piping shall be 2 inch diameter galvanized steel with Victaulic grooved ends. All connections shall be fitted with new Victaulic couplings and seals. Contractor shall have an allowance of \$1000.00 for Victaulic couplings and seals. This shall be adjusted up or down upon proof of invoice.
- 3.1.6.** Existing pipe brackets shall be reused.
- 3.1.7.** Scaffolding and Fall Arrest Procedures shall be followed for this work.

3.2 Location

- 3.2.1.** Winch Room Above Tow Wire Tensioner
- 3.2.2.** Fan Room on Focsle Deck

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

N/A

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: E-07	SPECIFICATION	TCMSB Field #: N/A
Incinerator Extended Spindle Access Box Replacement		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to replace the flush deck access box for the incinerator remote fuel shutoff.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1.

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT

2.3 Regulations

- 2.3.1.** Canada shipping Act.

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** Port fuel oil day tank shall be opened up, cleaned, and certified gas free. Ship's crew will drain the contents of the tank to suction level. Remaining fuel and liquid/debris from cleaning shall be disposed of.
- 3.1.2.** Insulation at the deck head of the incinerator compartment IWO existing valve shutoff access box shall be removed. The turning adapter at the end of the extended spindle in the deck access box shall be disconnected. The extended spindle shall be pulled clear of the access box. Securing points for the extended spindle will have to be released.
- 3.1.3.** The existing access box shall be cropped from the deck. The new access box is 5 inch diameter. The hole in the deck shall be dressed to allow welding in the new access box.
- 3.1.4.** The new access box is combined unit to cover the extended spindle and an operating mechanism for turning the extended spindle. The new access box will be CCG supplied.
- 3.1.5.** The following are guidelines for welding in the new access box. Coast Guard crew will assist dismantling and assembling the assembly.
 - 1. Remove cover
 - 2. Remove socket cap screws
 - 3. Slide weld sleeve off of housing. There are several o'ring seals that may make this a little difficult.
 - 4. Tack weld the Weld Sleeve into the deck opening, alternating from one area to another so as to reduce the amount of heat put on the Weld Sleeve, keeping warping to a minimum.
 - 5. Fully weld the Weld Sleeve
 - 6. Allow the Weld Sleeve to cool
 - 7. Same weld procedures for both sides of deck.
 - 8. Reassemble the Deck Box parts into the Weld Sleeve taking care not to damage the o'ring seals.
- 3.1.6.** A sleeve adapter shall be fabricated to fit on the end of the extended spindle and the operating shaft of the new deck box. This shall be drilled and pinned with stainless steel pin 1/4" diameter.
- 3.1.7.** The extended spindle shall be secured as originally found.
- 3.1.8.** All damaged coating IWO new deck box shall be power tooled clean and coated with two coats of International Interprime 234 alkyd marine primer.
- 3.1.9.** The insulation IWO the new deck box shall refitted with new insulation and sealed with insulation tape.
- 3.1.10.** Port Day Tank shall be boxed up with new neoprene gasket 1/4" thick with the center removed.

3.2 Location

- 3.2.1.** Focsle Deck Port Frame 99-100
- 3.2.2.** Incinerator Compartment Deck Head

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer & ABS.

4.2 Testing

- 4.2.1.** The extended spindle operating assembly shall be tested to prove operation.
- 4.2.2.** The deck welds shall be MPI tested.

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The Chief Engineer shall receive a typed written report in electronic format for work carried out.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: E-08	SPECIFICATION	TCMSB Field #: N/A
Emergency Fire Pump Suction & Discharge Valves.		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to overhaul the suction/discharge valves and extended spindle arrangements for both valves.
- 1.2 This work shall be carried out in Conjunction with the following:
 1. Seabay and Seabox Maintenance

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1. Suction Valve: 5 Inch Butterfly w/Geared Actuator and 90 degree Extended Spindle
- 2.1.2. Discharge Valve: 5 Inch Angle Globe Valve with Extended Spindle consisting of one 90 degree knuckle, one 90 degree universal joints and four standard universal joints.

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT
- 2.2.9. (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10. (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1. TC and ABS Fire Regulations

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

Suction Valve:

- 3.1.1.** Remove extended spindle from the deck plate level to the valve. The extended spindle runs vertically down approximately 4 feet to a 90 degree knuckle and then to the port approximately 3 feet to the geared actuator of the valve. The spindle is supported in bushings and coupled with sleeves and pins. The 90 degree knuckle shall be disassembled, remove the old grease and clean the internals. Check the play in the knuckle. The bushings IWO spindles shall be checked for wear. The coupling sleeves shall be disassembled and checked for play. The spindle arrangement shall be reassembled and the knuckle shall be repacked with new grease. Replacement of parts resulting from inspection shall be covered by 1379.
- 3.1.2.** The 5 inch butterfly valve with geared actuator shall be removed from the bulkhead at frame 99. The geared actuator shall be removed from the valve and disassembled to check for wear of the gears and bushings. Check for play between valve spindle and geared actuator. Check the seat and disc of the butterfly for damage and prove the operation of the valve is free. The valve and actuator shall be reassembled and the geared actuator shall be repacked with new grease. The valve shall be reinstalled as originally found.

Discharge Valve

- 3.1.3.** Remove the extended spindle arrangement for inspection and cleaning. The spindle arrangement consists of a flush deck actuator on the main deck in the winch room, extends into the engine room at a universal joint just below the main deck, down 6 feet to a 90 degree geared knuckle, outboard to a universal joint and further outboard 4 feet to a 90 degree universal joint, down to the deck of the engine room flat at another universal joint, through the deck of the engine room flat to another universal joint and then to the valve wheel of the discharge valve. All connections of the extended spindle arrangement are sleeved and pinned. The 90 degree knuckle shall be opened up, cleaned of grease to check gears and bushing for play. The knuckle shall be reassembled and packed with new grease. The remaining universal joints shall be checked for play. The flush deck actuator shall be checked for free movement with the extended spindle disconnected. The deck penetration bushes shall be proven clean and free for spindle movement. Replacement of parts resulting from the inspection shall be covered by 1379.

- 3.1.4. Remove the 5 inch angle globe valve and completely disassemble, clean and inspect. The discharge pipe to the fire main shall be fitted with a temporary blank while the valve is removed. The valve body shall be thoroughly cleaned of rust and debris. Remove old packing and clean bonnet. Seat and disc shall be lapped to provide a tight seal. All sealing surfaces shall be cleaned to bare metal. The valve shall be reassembled, with new packing and bonnet gasket. Spindle shall be greased prior to reassembly. New 5 inch Victaulic flange gaskets shall be replaced with new.

3.2 Location

- 3.2.1. Main Deck Winch Room, Port Side, Outside Incinerator Room.
- 3.2.2. Engine Flat Port 6000 A/B, Aft Of Bulkhead Frame 99
- 3.2.3. Lower Engine Room Port, Emergency Fire Pump, Aft Of Bulkhead Frame 99

3.3 Interferences

- 3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1. All work shall be completed to the satisfaction of the Chief Engineer. ABS & Chief Engineer or designate shall witness inspections.

4.2 Testing

Test operation of extended spindles following the complete reassembly of the spindle and valve systems. Test for leaks during the refloat of the vessel.

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out.

- 5.2 Spares**
N/A
- 5.3 Training**
N/A
- 5.4 Manuals**
N/A

Spec item #: E-09	SPECIFICATION	TCMSB Field #: N/A
Fuel Oil Purifier Replacement		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to replace the two existing fuel oil purifiers with new Alfa Laval purifiers. This specification is in conjunction with Poseidon Marine Consultants Technical Specification 19-096-003.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** PMC Technical Specification Purifier Replacement 19-096-003
- 2.1.2.** 51489463#0 Alfa Laval Flow Chart-Single Flex P636 MDO
- 2.1.3.** 51489464#0 Alfa Laval Dimensional Drawing-Single Flex P636 MDO
- 2.1.4.** 51489465#0 alfa Laval Installation Drawing-Single Flex P636 MDO
- 2.1.5.** 51489466 Rev 1.0 Alfa Laval Electrical Diagrams
- 2.1.6.** 71-04-01 Fuel Oil Diagram (CAD Version)
- 2.1.7.** Alfa Laval local Representative
Madsen Diesel & Turbine
141 Glencoe Drive
Mount Pearl (St. John's), NL A1N 4S7
T: (709) 726-6774
C: (709) 769-7275

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT

2.3 Regulations

- 2.3.1.** Electrical standards TP 127 – Ship Safety electrical Standards
- 2.3.2.** IEEE Standard 45- Recommended practices for Electrical Installation on Shipboard
- 2.3.3.** Canada Shipping Act 2001 Hull Insp.
- 2.3.4.** Marine Safety Regulatory Authority
- 2.3.5.** ABS Machinery Regulations

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The purifiers are located above the fuel oil sludge tank port side between frames 107 and 111.
- 3.1.2.** The contractor shall have an allowance of \$10,000.00 for the services of Alfa Laval FSR to commission the new purifier units following the installation. This shall be adjusted up or down upon proof of invoice by 1379.
- 3.1.3.** The new Fuel Oil Purifiers are currently stored at Coast Guard Technical Stores. The contractor shall advise 48 hours in advance for delivery of the new purifiers prior to installing the units.
- 3.1.4.** The new Purifiers are skid mounted complete with control panel, feed pump and control valves. The skid units shall be disassembled to the point of allowing transport to the Forward Lower Auxiliary Machinery Space. The units shall be reassembled as originally found. There are two access routes available, Mud Room Tween Deck or Winch Room Main deck.
- 3.1.5.** The existing power feed cables to each Purifier shall be reused. The cables shall not be cut. The existing alarm wiring for the A&M system shall also be reused. The two disconnect breakers at MCC # 5 Section 1R and MCC # 1 Section 2F in the MCR shall be replaced with new CCG supplied breakers.
- 3.1.6.** A separate CCG supplied emergency stop switch shall be installed for each Purifier Unit. Switches shall be connected by 4C #14 marine cables from switches to control panels. The location shall be on the forward side of watertight bulkhead at frame 99 in the Lower Auxiliary Machinery Space. The switches shall be labelled with lacmoid tags with ¾" lettering size.

- 3.1.7. The existing units recirculate the fuel to the suction side of the feed pump during recirculation/discharge mode. The new units shall be piped to the 2 inch Ø settling tank discharge pipe. Two separate pipes shall be installed from the new units and branched into the settling tank discharge pipe at “Y” connections. The branches shall be spaced 1 meter apart. The location of the branches shall be in an area between the seawater pumps and bulkhead at frame 99 under the deck plates. New check valves shall be installed in the new recirculating branch pipes; valves shall be horizontal swing check with socket weld flanges.
- 3.1.8. The existing 4 inch Ø sludge connections at the sludge tank top shall be reused. The 4 inch Ø pipe at these connections shall be modified to suit the sludge and drains from the purifiers.

3.2 Location

- 3.2.1. Lower Auxiliary Machinery Space Frames 107-111
- 3.2.2. MCR at MCC # 5 and 1.

3.3 Interferences

- 3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1. All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

As part of FSR Commissioning

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out.

- 5.2 Spares**
N/A
- 5.3 Training**
N/A
- 5.4 Manuals**
N/A

Spec item #: E-10	SPECIFICATION	TCMSB Field #: N/A
Engine Room Supply Fan Overhaul		

Part 1: SCOPE:

1. The intent of this specification shall be to remove engine room supply fans (four in number) units complete, for overhaul, cleaning and inspection. Upon completion, all units shall be reinstalled in original positions and tested.

1.1 This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Hull No 1-07 62-00--02 SHT 1 FR 1 Machinery Space Ventilation Engine Room
- 2.1.2.** Hull No 1-07 62-00--02 SHT 1 FR 2 Machinery Space Ventilation Engine Room
- 2.1.3.** Hull No 1-07 62-00--02 SHT 1 FR 3 Machinery Space Ventilation Engine Room
- 2.1.4.** Norris Warming Manual
- 2.1.5.** Fans are:
Canadian Buffalo
HB Vanaxial Fans, direct Drive
32500 CFM
36" Blade Diameter
- 2.1.6.** Motors are:
Estatech
30 HP
440V, 3 Phase, 60 Hz.
1200/1800 RPM
Frame Size: 364T
- 2.1.7.** Following four units shall be dealt with:
 - i. Port Outboard Supply
 - ii. Port Inboard Supply
 - iii. Starboard Inboard Supply
 - iv. Starboard Outboard Supply
- 2.1.8.**

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1.** TP 127E Ship Electrical Standards – Marine Safety

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** Fans are located in port and starboard upper engine room casings at “B” deck level. Access is difficult, area of work is restricted. Access to the supply fans is by manhole cover behind the wheel house port and stbd.
- 3.1.2.** Crane shall be required to remove and install fans motors from the space.
- 3.1.3.** The decking IWO manhole is coated with International Intershield 300 followed by Intershield 6GV Heavy Duty Non Skid. Contractor shall be required to cut free the manhole combing and to later weld combing back into place upon completion of the work to allow for fan motor removal and installation (motors are larger than the manhole opening). Hot Work Permits shall be required. Damaged deck coating shall be repaired with above noted coating system. Damaged coating inside the plenum shall be coated with two coats of alkyd primer and one coat of International Interlac 665. Intact coating shall be feathered back with power tools.
- 3.1.4.** Temporary plywood covers shall be required to be fitted over the holes in the deck to keep out rain and inclement weather. Area shall be barricaded to prevent personnel from falling into the hole.

- 3.1.5.** Each unit shall be electrically isolated, locked out and disconnected.
- 3.1.6.** Fan motors and blades shall be removed from casings and transported to contractors shop facility. Any shims fitted at fan mounting arrangement shall be carefully removed, retained and identified as to relative position.
- 3.1.7.** Air ducting openings at louvers shall be blanked with plywood, when fans are removed.
- 3.1.8.** Contractor shall be responsible for removal of any interference items or removals required to allow access, removal and disassembly of fan units. Any interference item so disturbed or removal shall be returned to original situation.
- 3.1.9.** Each motor shall be meggered before removal and after reinstallation. All results to be recorded.
- 3.1.10.** Motors shall be completely disassembled.
- 3.1.11.** Rotors and stators shall be steam or solvent cleaned and baked. Winding insulation shall be inspected and tested. Windings shall be reinsulated with good quality insulating varnish or equivalent, to normal marine electrical standards. Winding lead wires and terminal blocks shall be inspected.
- 3.1.12.** Exterior of motor shall be shot blasted clean.
- 3.1.13.** End bell bearing bores shall be measured and bearing fit determined.
- 3.1.14.** Contractor shall quote, separately, unit cost to bore and bush end bell to re-establish correct bearing fit.
- 3.1.15.** All bearings shall be replaced with new SKF sealed bearings. Contractor shall bid an allowance of \$1500.00 for supply of new bearings and to be adjusted by 1379 following proof of invoice.
- 3.1.16.** Motors shall be reassembled and painted with two (2) coats of epoxy paint.
- 3.1.17.** Motors shall be bench tested and amperage recorded.
- 3.1.18.** Fan blades shall be shot blasted clean.
- 3.1.19.** Fan shall be reinstalled on motor and assembly dynamically balanced using Vibration analysis. Balancing reports shall be given to Chief Engineer.
- 3.1.20.** Fans motors shall be returned to the ship, installed in casings with all new hardware and original shims if fitted. Contractor shall insure fans motors and blades are returned to their original locations. Units shall be re-connected electrically and all removals returned to original condition. Note: Contractor shall take care when installing the fan and motor units to make sure they are centrally oriented in the duct work and that the fan blades are not touching the housings.
- 3.1.21.** Fan units shall be test run for 30 minutes on each low speed and high speed. Current draw shall be recorded at each speed after 20 minutes running.
- 3.1.22.** Three (3) type written copies of the service report detailing all inspection points, readings recorded, repairs made and parts replaced shall be compiled and made available to Chief Engineer.
- 3.1.23.** All work shall be completed to satisfaction of Chief Engineer.

3.2 Location

- 3.2.1.** "C" Deck aft of wheelhouse bridge wings.
- 3.2.2.** Engine Room Supply air plenum below "C" Deck

3.3 Interferences

3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.4. All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

Proper operation shall be tested after Installation.

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Contractor shall provide a final service report of all readings, measurements, and service work completed.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: E-11	SPECIFICATION	TCMSB Field #: N/A
Engine Room Exhaust Fan Overhaul		

Part 1: SCOPE:

1. The intent of this specification shall be to remove engine room exhaust fans (four in number) units complete, for overhaul, cleaning and inspection. Upon completion, all units shall be reinstalled in original positions and tested.

1.1 This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Hull No 1-07 62-00--02 SHT 1 FR 1 Machinery Space Ventilation Engine Room
- 2.1.2.** Hull No 1-07 62-00--02 SHT 1 FR 2 Machinery Space Ventilation Engine Room
- 2.1.3.** Hull No 1-07 62-00--02 SHT 1 FR 3 Machinery Space Ventilation Engine Room
- 2.1.4.** Norris Warming Manual
- 2.1.5.** Fans are:
Canadian Buffalo
HB Vanaxial Fans, direct Drive
32500 CFM
36" Blade Diameter
- 2.1.6.** Motors are:
Estatech
30 HP
440V, 3 Phase, 60 Hz.
1200/1800 RPM
Frame Size: 364T
- 2.1.7.** Following two units shall be dealt with:
 - i. Port Exhaust Fan
 - ii. Starboard Exhaust Fan

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)

- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT
- 2.2.9. (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10. (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1. TP 127E Ship Electrical Standards – Marine Safety

2.4 Owner Furnished Equipment

- 2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1. Fans are located in port and starboard upper engine room casings at “B” deck level. Access is difficult, area of work is restricted. Access to the exhaust fans is by manhole cover behind the wheel house port and stbd. and by the engine room uptakes port & stbd.
- 3.1.2. Staging, rigging and chain falls will be required to remove and later install the fan motors.
- 3.1.3. Each unit shall be electrically isolated, locked out and disconnected.
- 3.1.4. Fan, casings, damper, plenums and fan space shall be thoroughly cleaned and degreased. All dirt, oil and rust shall be removed from fan casing internal areas, old gaskets shall be removed and flanges cleaned. Casings shall be visually inspected for cracks, wastage or any other defect Air trunk flanges shall have all old gasket material removed and cleaned. New gaskets shall be supplied and installed at all flanged joints. Any mounting shims shall be cleaned and re-used in original locations.
- 3.1.5. Fan intake plenums shall be removed. Damper linkage shall be let go. Damper housing shall be unbolted and removed to gain access to fan blade and motor.
- 3.1.6. Contractor shall be responsible for removal of any interference items or removals required to allow access, removal and disassembly of fan units. Any interference item so disturbed or removal shall be returned to original situation, in good order, on completion of fan work.

- 3.1.7.** Each motor shall be meggered before removal and after reinstallation. All results to be recorded and given to Chief Engineer.
- 3.1.8.** Fan blades shall be removed. Electric motors shall be unbolted from casings and lowered down through the uptakes to the entrance of the engine room door and then transported to contractors shop facility. Any shims fitted at fan mounting arrangement shall be carefully removed, retained and identified as to relative position.
- 3.1.9.** Motors shall be completely disassembled.
- 3.1.10.** Rotors and stators shall be steam or solvent cleaned and baked. Winding insulation shall be inspected and tested. Windings shall be re-insulated with good quality insulating varnish or equivalent to a marine electrical standard. Winding lead wires and terminal blocks shall be inspected.
- 3.1.11.** Exterior of motor shall be shot blasted clean.
- 3.1.12.** End bell bearing bores shall be measured, recorded and bearing fit determined.
- 3.1.13.** Contractor shall quote, separately, unit cost to bore and bush end bell to re-establish correct bearing fit.
- 3.1.14.** All bearings shall be replaced with new SKF sealed bearings. Contractor shall bid an allowance of \$800.00 for supply of new bearings and to be adjusted by 1379 following proof of invoice.
- 3.1.15.** Motors shall be reassembled in good order and painted with two (2) coats of epoxy paint.
- 3.1.16.** Motor shall be bench tested and witnessed by Chief Engineer or his delegate.
- 3.1.17.** Fan blades shall be shot blasted clean.
- 3.1.18.** Fan shall be reinstalled on motor and assembly dynamically balanced using Vibration analysis. Balancing reports shall be given to Chief Engineer.
- 3.1.19.** Motors and fans shall be returned to the ship and installed in the casing with all new hardware and original shims if fitted. Contractor shall insure fans are returned to their original locations. Note: Contractor shall take care when installing the fan and motor units to make sure they are centrally oriented in the duct work and that the fan blades are not touching the housings.
- 3.1.20.** Units shall be reconnected electrically and all removals returned to original condition.
- 3.1.21.** Contractor shall install the damper housing and reconnect up the linkage. Intake plenum shall be installed and bolted in place. Contractor shall supply and install six (6) appropriately sized steel bolts, nuts and lock washers as directed by the Chief Engineer where they are missing into the two (per plenum) brackets which are welded to the uptake frames.
- 3.1.22.** Fan units shall be test run for 30 minutes on each low speed and high speed. Current draw shall be recorded at each speed after 20 minutes running.
- 3.1.23.** Three (3) type written copies of the service report detailing all inspection points, readings recorded, repairs made and parts replaced shall be compiled and made available to Chief Engineer.
- 3.1.24.** All work shall be completed to satisfaction of Chief Engineer.

3.2 Location

- 3.2.1.** “C” Deck aft of wheelhouse bridge wings.
- 3.2.2.** Engine Room Exhaust Casing Port and Starboard

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

Proper operation shall be tested after installation.

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** Contractor shall provide a final service report of all readings, measurements, and service work completed.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: E-12	SPECIFICATION	TCMSB Field #: N/A
Clean & Pickle Fuel oil Piping		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to pickle piping from the Fuel Oil Purifiers to the Port and Starboard Day Tanks, and fitted pipe transits at bulkheads and decks where the pipe passes through.
- 1.2** This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1.

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT

2.3 Regulations

- 2.3.1.** Canada Shipping Act.

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The starboard piping from the purifiers is 4 inch Ø pipe bolted flanges. The following is location of starboard pipe and approximate lengths:
 - 1. Stbd Engine Room Casing Main Deck – 1 section, 16.5 feet length, 1 deck transit
 - 2. Stbd Generator Flat – 1 section, 20 feet length, open transit at deck.
 - 3. Lower Auxiliary Mach. Space – 2 sections, 32 feet length
- 3.1.2.** The port piping from the purifiers is 2 inch Ø pipe bolted flanges. The following is location of port pipe and approximate lengths:
 - 1. Lower Auxiliary Mach. Space – 1 section, 11 feet length
 - 2. Port Generator Flat – 2 sections, 20 feet length, 1 deck transit
 - 3. Incinerator Room – 3 sections, 29 feet length, 1 deck transit
- 3.1.3.** The piping shall be disconnected and sent ashore for pickling. Fitted deck transits shall be pickled in-situ.
- 3.1.4.** One section of 4 inch Ø pipe in the generator flat aft of SS generator shall be cut in two places and fitted with bolted flanges for removal purposes. The next section of pipe extends into Lower Auxiliary Mach. Compartment is flanged above and below the generator flat deck, hence not allowing the pipe to be removed. This shall be cut just below the deck and fitted with bolted flanges for removal purposes. All modified pipe with flanges new flanges shall be pressure tested at 150 psi.
- 3.1.5.** All piping shall be returned to the vessel and reassembled.
- 3.1.6.** All flanges shall be wire brushed cleaned to bare metal and fitted with new gaskets approved for diesel fuel when reassembled.
- 3.1.7.** Following the reassembling of the pipes, all connections shall be proven liquid tight by normal operation of liquid media.

3.2 Location

- 3.2.1.** Starboard Engine Room Casing Main Deck
- 3.2.2.** Generator Flat Port and Starboard
- 3.2.3.** Incinerator Compartment Main Deck Port

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

Testing for leaks after installation.

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: ED-01	SPECIFICATION	TCMSB Field #: N/A
Port Intermediate Shaft Replacement		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to replace the aft # 1 intermediate shaft with a new CCG supplied shaft. The work described in this spec shall be in addition to the Poseidon Marine Consultants SOW 19-046-001 and Drawing 19-045-100
- 1.2** The contractor shall obtain the services of Wartsila FSR for the disconnection of the sterntube seal, SKF coupling, and the Morgrip Bolts for both ends of the shaft.
- 1.3** This work shall be carried out in Conjunction with the following:
 - a.** Port Shaft Alignment

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** PMC SOW 19-046-001
- 2.1.2.** PMC Removal Drawings 19-045-100

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1.** TC Marine Machinery Regulations

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** Due to the importance and sensitivity of the equipment in this specification item, the Contractor shall ensure that grit / sand blasting operations are not carried out in the dry dock for the duration of this specification item.
- 3.1.2.** The contractor shall obtain the services of the Wartsila Propulsion Field Service Rep to supervise the work specified in this specification. Allow \$40,000.00 for the services of the representative and adjust the final cost by 1379 action.
- 3.1.3.** The qualified service representative shall be in attendance at all times when this work is being carried out. The procedure listed below shall be used as a guideline only. Contractor and the service representative will co-ordinate activities to ensure the tail shaft is safely moved aft and jacked forward for reconnection. Manuals for use of hydraulic tools are available from the Chief Engineer.
- 3.1.4.** Oil shall be drained from hub and disposed of by Contractor, approximately 1,200 liters of oil in hub assembly.

Rope Guard

- 3.1.5.** Starboard rope guard shall be removed in half sections and lowered to dock floor.
- 3.1.6.** Contractor shall use air-gouging equipment to remove circumferential and butt welds to minimize damage to rope guard landing faces and damage to stern tube bushings. Contractor must install a fire blanket barrier inside the rope guard up against the aft end of the Stern tube bushings to prevent slag from damaging the bushings.
- 3.1.7.** After rope guard has been removed, Contractor shall grind off weld slag and spatter debris on stern tube castings and rope guard landing faces.
- 3.1.8.** Contractor shall quote on the supply and installation of 25 feet of stainless steel locking wire to replace missing or damaged lock wire on stern tube retaining bolts.
- 3.1.9.** To install rope guard, use E 8018 –C1 electrodes and ensure preheat and interpass temperatures in the range of 140°C to 204°C can be maintained during the welding operations. Contractor shall ensure a 10 mm to 15 mm gap is kept between the propeller forward face and the rope guard aft edge. 12 mm continuous fillet welds to be used around rope guard circumference to shaft bracket casting. Butts shall be continuous weld.
- 3.1.10.** Rope guard shall be grit blasted both sides and both sides painted as per painting specification for underwater hull. After installation, welded area paint shall be touched up.

Tailshaft Weardown

- 3.1.11.** Clearances at aft Starboard tail shaft bearings, shall be taken with feeler gauges at 90° intervals around shaft and recorded after the new shaft is installed with new sterntube bearings.
- 3.1.12.** Clearances and poker gage readings shall be taken with the Chief Engineer's designate in attendance. Staging costs shall be included in Contractor's quotation.
- 3.1.13.** Wear down of shaft bearings shall be determined by means of poker gauges. Poker gages for measuring wear down are held onboard the ship and will be made available to the contractor.
- 3.1.14.** Poker and feeler gauge readings shall be recorded with 3 typewritten copies passed to the Chief Engineer within three days.

Sterntube Shaft Seal:

- 3.1.15.** Contractor shall remove the Port stern tube inboard seal assembly to allow the shaft to be pulled aft for the removal of the SKF coupling.
- 3.1.16.** The stern tube seal is a Wartsila UK, 840 MOD 800 Type MA Seal. A manual for stern tube seal is available from the Chief Engineer.
- 3.1.17.** The seal cooling water piping shall be removed and stored as required.
- 3.1.18.** The drive clamp, seat and face inserts shall be removed and laid aside in the Mud Room in same manner to avoid damage to the parts. The remaining seal assembly shall be lifted out of the shaft tunnel as an assembly and laid aside in a safe manner to avoid damage. The MA seal is a fully split face type seal. Wartsila service representative shall be in attendance at all times when this work is being carried out. Contractor and the service representative will co-ordinate activities to ensure correct installation of parts.
- 3.1.19.** The seal assembly shall be reinstalled using CCG supplied parts from Service kit "A".

SKF Coupling Removal:

- 3.1.20.** Area in way of the stern tube seal shall be cleaned of dirt, rust and debris before moving the shaft.
- 3.1.21.** If required, ship staff will rotate shaft to allow for hydraulic connections can be made to SKF coupling. Sections of stern tube cooling water piping and shaft seal water piping may be removed and stowed by Contractor if required. Coast Guard (GSM) shall supply hydraulic pump unit for coupling removals.
- 3.1.22.** To remove the MORGRIP bolts, shaft can be rotated and small port-a-pack jacks can be used with the strong-back to ease out the MORGRIP bolts. Flanges and MORGRIP bolts shall be marked as to their original locations and the bolts taken to the Contractor's machine shop for reference. New MORGRIP bolts will be used with the SKF coupling and the new intermediate shaft.
- 3.1.23.** The SKF coupling shall be temporarily removed from the shaft tunnel for removal of the intermediate shaft. Tail shaft shall be pushed aft a distance of 320 mm using jacks at propeller hub.
- 3.1.24.** Disconnect inner oil pipe, and store flange bolts.
- 3.1.25.** Tailshaft shall be moved another 200 mm aft.

- 3.1.26.** Shaft and coupling location shall be marked at aft end of coupling before pumping coupling off shaft. SKF coupling shall now be pumped off using SKF pump equipment. Contractor shall ensure during removal that coupling is properly supported and does not damage tapered area of shaft. Shaft and coupling tapered sections shall be thoroughly cleaned.
- 3.1.27.** Following the removal and replacement of the intermediate shaft the coupling shall be reinstalled and aligned to the intermediate shaft.
- 3.1.28.** The bolt holes bores of the coupling and intermediate shaft shall be reamed. New Coast Guard supplied MORGRIP bolts will be used for reassembly. The bolts shall be machined to final dimensions to suit the coupling and intermediate shaft bolt hole bores. The old Morgrip bolts shall be cleaned up, measured, and reused if the dimensions will allow. Three (3) typewritten copies of readings shall be given to Chief Engineer.

Connection Flange at Flywheel Location:

- 3.1.29.** The flywheel shall be supported during the removal of the aft intermediate aft. The flywheel is connected to the forward intermediate shaft with a separate ring of bolts at a larger PCD.
- 3.1.30.** The MORGRIP bolts at the connection flange of the forward and aft intermediate shaft shall be removed in the same manner as the coupling flange. Flanges and MORGRIP bolts shall be marked as to their original locations and the bolts taken to the Contractor's machine shop for reference. New MORGRIP bolts will be used with this connection flange of the new intermediate shaft and the forward intermediate shaft.
- 3.1.31.** The shaft shall be jacked aft to access the inner pipes for disconnection.
- 3.1.32.** Following the removal and replacement of the intermediate shaft the shaft flanges shall be aligned for the bolt holes reaming.
- 3.1.33.** The bolt holes bores of the intermediate shafts shall be reamed. New Coast Guard supplied MORGRIP bolts will be used for reassembly. The bolts shall be machined to final dimensions to suit the coupling and intermediate shaft bolt hole bores.
- 3.1.34.** Final diameter measurements of all bolts and bolt holes shall be measured and recorded with referenced to bolt hole numbers. Three (3) typewritten copies of readings shall be given to Chief Engineer.

Shaft Bearings:

- 3.1.35.** The bearing shells shall be removed from the housings and laid aside for reuse. The oil pipe from the housing to the bearing shell shall be removed before rolling out the bottom shell. The temperature transducer probes shall be removed and laid aside for reuse. The oil slinger shall be removed from the bearing and laid aside for reuse.
- 3.1.36.** The bearings are secured on adjustable steel chocks. These shall be tagged for their location and reused.
- 3.1.37.** The bearings are fitted with attached oil lift pumps and motors. These shall be removed and laid aside for reuse.

Post Installation:

- 3.1.38. The shaft sleeve is now positioned and fastened. Maximum run out should be no more than 0.2 mm.
- 3.1.39. The shaft shall be rotated by ship's staff to position the vent & drain holes on the propeller hub to the 12 o'clock and 6 o'clock positions respectively.
- 3.1.40. The CPP system shall be filled with the appropriate oil. The propeller hub vent plug shall be removed. Header tank by pass valve shall be closed. One CPP pump is required with occasional activation of ahead and astern movement from the MCR. NOTE: LIPS service representative to ensure the blades are '0' (zero) pitched before undocking.
- 3.1.41. Ship's staff will assist in this operation, which takes 7 to 8 hours to complete. When oil has reached the top of the vent hole, the vent plug shall be installed.
- 3.1.42. System shall be bled of all air from within hub.
- 3.1.43. System pumps shall be run up and blades moved to ensure free operation.
- 3.1.44. All removed piping in shaft tunnel shall be installed and pressure tested.
- 3.1.45. See Starboard Rope Guard installation.
- 3.1.46. Contractor to include in cost the fitting and removal of any welded lugs required to carry out this work. On completion of this work and before dry dock is flooded, all lug welds shall be ground flush. The area of damaged coating shall be prepared and repaired with Intershield 163 Inerta 160. The coating preparation and application shall be applied as per International Coating specifications.

Shaft Alignment:

- 3.1.47. Shaft alignment shall be completed following the refloat of the vessel.
- 3.1.48. All tools provided by CCG shall be cleaned and returned to storage areas and secured under the supervision of Chief Engineer's designate.
- 3.1.49. The completed installation shall be functionally tested during sea trials.

3.2 Location**3.2.1.****3.3 Interferences**

- 3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:**4.1 Inspection**

- 4.1.5. All work shall be completed to the satisfaction of the Chief Engineer, ABS Surveyor and Wartsila FSR.

4.2 Testing
Proper operation tested at Sea trials.

4.3 Certification
N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Chief Engineer shall receive a typed written report in electronic format for work carried out including all readings, measurement, temperatures, pressures, etc.

5.2 Spares
N/A

5.3 Training
N/A

5.4 Manuals
N/A

Spec item #: ED-02	SPECIFICATION	TCMSB Field #: N/A
Port Shafting System Alignment		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to check the alignment of the port shaft system from the gearbox running aft.
- 1.2 This work shall be carried out in Conjunction with the following:
Port Intermediate Shaft Replacement and Survey

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1. Installation Alignment Main Engines & Gearboxes & Propulsion Shafting # 61-00-SK45
- 2.1.2. Propulsion Machinery HD Bolts & Chocks # 60-00-04
- 2.1.3. TFOX Tailshaft

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT

2.3 Regulations

- 2.3.1. Canada Shipping Act.

2.4 Owner Furnished Equipment

- 2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. The following is Wartsila's General Process for Alignment, to be considered only estimations.

- Typically the team requires one day prior to the docking of a vessel.
- One day prior to the shaft dismantling for a reference measurement – hull deflection when compared to the pre docking measurement.
- One day for measurements of the intermediate shafting, to be left in place.
- New calculation for evaluation of current alignment.
- Depending on the findings, the repair process will be adapted to the requirements.
- After repair we need one day for the final set of measurements and installation of portable monitoring system.
- In total we would estimate approximately 10 days, but to be integrated in the docking schedule.

3.1.2. Contractor shall obtain the services of Wartsila Propulsion Alignment Specialist to perform the specified work. Contractor shall have an allowance of \$50,000.00 for their services and adjusted by 1379 following proof of invoice. Allow 2 days to perform pre-drydocking alignment checks as reference. Allow 2 days prior to shaft dismantling for a reference measurement hull deflection when compared to pre-docking measurement. Allow 10 days for the alignment and subsequent adjustments while the vessel is floated after drydocking. The contractor shall provide 3 workers to assist in the alignment procedures.

3.1.3. The two shaft bearings IWO Aft Intermediate shaft shall be aligned to the shaft as these were removed to allow for the replacement of the new intermediate shaft.

3.1.4. The shaft line consists of three shaft bearings. The bearings are fitted with steel adjustable chocks.

3.1.5. The final alignment procedure shall be completed while the vessel is afloat and following the drydocking portion of the refit.

3.1.6. The alignment check shall make use of strain gauges, load measuring gauges, displacement, and laser alignment equipment. 3D scanning methods in conjunction with bearing load measurements can be used as well.

3.1.7. The three shaft bearings shall be aligned as instructed by the Wartsila Alignment Specialists.

3.2 Location

3.2.1. Port side Shaft Tunnel

3.2.2. Port Side Aft Lower Auxiliary Machinery Compartment

3.2.3. Aft Main Engine Room

3.3 Interferences

3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer, ABS Surveyor and Wartsila FSR.

4.2 Testing

Dock Trial and Sea Trails

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Provide copies of Wartsila service reports and alignment reading.

5.1.2 Provide copies of the main engine to gearbox alignment readings.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec item #: ED-03	SPECIFICATION	TCMSB Field #: N/A
Steering Pumps & Motors Inspection / Overhaul		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to remove the following pump motors for service maintenance and testing. The pumps will be overhauled by the vessel's crew. The pumps to be overhauled by a hydraulics company.
- 1.2 This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1. Steering Gear Pump Motor 2 of
Manufacturer: Baldor
Frame Size: 365TC / Cast iron
HP & Speed: 75 HP@ 1760
V/Ph/Hz: 460/3/60
Enclosure: TEFC
- 2.1.2. Emergency Steering Gear Pump Motor 1 of
Manufacturer: Baldor
Frame Size: 213TC / Cast iron
HP & Speed: 7.5 HP@ 1725
V/Ph/Hz: 460/3/60
Enclosure: TEFC

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT
- 2.2.9. TP127E Ships Electrical Standards

2.3 Regulations

2.3.1. Canada Shipping Act.

2.4 Owner Furnished Equipment

2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1. All motor units shall be dealt with in the same manner for purposes of clarity.
- 3.1.2. The pump units shall be locked out by the contractor's lockouts. The vessel's lockout book shall be recorded.
- 3.1.3. The motors shall be labeled for correct orientation to ensure they are reinstalled on the correct pump and in the correct position. The power supply cables shall be disconnected and labeled. The motors shall be removed from the pump housings and sent to an authorized motor refurbishment facility.
- 3.1.4. The motor shall be completely disassembled for routine maintenance, inspection and testing. Work shall include but not limited to the following; rotor shaft measurements and run-out, flange face run-out, spigot run-out, shaft end play, bearing housing measurements and run-out, clean dip and bake, dynamic balance, resistance test, bench test run, and vibration readings. New bearings shall be installed.
- 3.1.5. The units shall be transported back to the vessel and installed as originally found.

3.2 Location

- 3.2.1 Steering Gear Pump Motor 2 of Frame 4 & 0, P&S Steering Flat
- 3.2.2. Emergency Steering Gear Pump Motor 1 of Stbd Steering Flat

3.3.1 Interferences

3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer & ABS.

4.2 **Testing**

The pumps units shall be ran and motor bearing temperature recorded every 15 minutes for a 2 hour period. The motor current shall be recorded after the initial start, at each phase.

4.3 **Certification**

N/A

Part 5: DELIVERABLES:

5.1 **Drawings/Reports**

5.1.1 All measurements and readings shall be tabulated in type written format and given to the Chief Engineer.

5.2 **Spares**

N/A

5.3 **Training**

N/A

5.4 **Manuals**

N/A

Spec item #: ED-04	SPECIFICATION	TCMSB Field #: N/A
Stbd Tailshaft Replacement		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to replace the Starboard tailshaft, SKF coupling, and sterntube bushings with new CCG supplied equipment. Obtain a survey credit from ABS.
- 1.2 This work shall be carried out in Conjunction with the following:
 - Starboard Propeller Blades and Hub Survey

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1. Contact : Wartsila Canada, Barry Broderick
- 2.1.2. The following weights are applicable:
 - Propeller + shaft flange + oil = 38500 KG
 - Propeller shaft + pipes + oil = 46765 KG
 - Length of tail shaft to forward end of hub = 13.94 meters
 - SKF coupling & ring nut = 2240 KG
- 2.1.3. LIPS Arrangement Of Shafting Drawing # A006759
- 2.1.4. Wartsila Type MA Seal Assembly Drawing # H30850-01
- 2.1.5. Oil Type: Petro Canada Hydrex AW 68
- 2.1.6. Oil Capacity 1200 liters
- 2.1.7. Wartsila Water Lubricated Bearing Manual DPM-01

2.2 Standards

- 2.2.1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3. Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4. Coast Guard ISM Hotwork procedures
- 2.2.5. Coast Guard ISM Fall Protection procedures
- 2.2.6. Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7. CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8. SSPC-SPT
- 2.2.9. (a) TP 127E-TC Marine Safety Electrical Standards.

2.2.10. (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

2.3.1. Canada Shipping Act.

2.4 Owner Furnished Equipment

2.4.1. The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. Due to the importance and sensitivity of the equipment in this specification item, the Contractor shall ensure that grit / sand blasting operations are not carried out in the dry dock for the duration of this specification item.

3.1.2. The contractor shall obtain the services of the Wartsila/LIPS Field Service Rep to supervise the work specified in this specification. Allow \$40,000.00 for the services of the representative and adjust the final cost by 1379 action.

3.1.3. The qualified service representative shall be in attendance at all times when this work is being carried out. The procedure listed below shall be used as a guideline only. Contractor and the service representative will co-ordinate activities to ensure the tail shaft is safely removed and installed on completion. Manuals for use of hydraulic tools are available from the Chief Engineer.

Tailshaft Weardown

3.1.4. Clearances at aft Starboard tail shaft bearings, shall be taken with feeler gauges at 90° intervals around shaft and recorded after the new shaft is installed with new sterntube bearings.

3.1.5. Clearances and poker gage readings shall be taken with the Chief Engineer's designate in attendance. Staging costs shall be included in Contractor's quotation.

3.1.6. Wear down of shaft bearings shall be determined by means of poker gages. Poker gages for measuring wear down are held onboard the ship and will be made available to the contractor.

3.1.7. Poker and feeler gauge readings shall be recorded with 3 typewritten copies passed to the Chief Engineer within three days.

Disassembly:

3.1.8. Ensure propeller pitch is left in full astern position for later disconnection of inner oil pipe.

3.1.9. Open by-pass valve on CPP system header tank to drain tank.

3.1.10. Contactor shall supply and install suitable welded lifting lugs on the ship's hull as required to carry out this work. Lifting eye pads located on the ship's hull are not to be used. On completion of all work, lifting lugs shall be air arc gouged off, areas to be ground smooth and painted as per underwater hull coating system.

Rope Guard

- 3.1.11.** Starboard rope guard shall be removed in half sections and lowered to dock floor.
- 3.1.12.** Contractor shall use air-gouging equipment to remove circumferential and butt welds to minimize damage to rope guard landing faces and damage to Thordon stern tube bushings. Contractor must install a fire blanket barrier inside the rope guard up against the aft end of the Thordon bushings to prevent slag from damaging the Thordon.
- 3.1.13.** After rope guard has been removed, Contractor shall grind off weld slag and spatter debris on stern tube castings and rope guard landing faces.
- 3.1.14.** Contractor shall quote on the supply and installation of 25 feet of stainless steel locking wire to replace missing or damaged lock wire on stern tube retaining bolts.
- 3.1.15.** To install rope guard, use E 8018 –C1 electrodes and ensure preheat and interpass temperatures in the range of 140°C to 204°C can be maintained during the welding operations. Contractor shall ensure a 10 mm to 15 mm gap is kept between the propeller forward face and the rope guard aft edge. 12 mm continuous fillet welds to be used around rope guard circumference to shaft bracket casting. Butts shall be continuous weld.
- 3.1.16.** Rope guard shall be grit blasted both sides and both sides painted as per painting specification for underwater hull. After installation, welded area paint shall be touched up.

Mud Room Deck Removal

- 3.1.17.** The deck in the lower mud room above the Starboard sterntube seal shall be cut out to allow removal and installation of the shaft seal, SKF Coupling, and sterntube bushings. Contractor shall consult with TCMSB before removal takes place. The opening shall be as large as possible without disturbing deep frames and adjacent bulkheads.

Inner Shaft Seal

- 3.1.18.** Contractor shall remove the Starboard stern tube inboard seals and inflatable tire and install new owner supplied seals and tire (GSM). The MA seal is a fully split face type seal. Wartsila service representative shall be in attendance at all times when this work is being carried out. The procedure listed below shall be used as a guideline only. Contractor and the service representative will co-ordinate activities to ensure correct installation of parts.
- 3.1.19.** The stern tube seal is a Wartsila UK, 840 MOD 800 Type MA Seal. A manual for stern tube seal is available from the Chief Engineer.
- 3.1.20.** Stern tube cooling water piping and seal cooling water piping shall be removed and stored as required.
- 3.1.21.** The split liner on the tailshaft shall be removed and discarded. The new tailshaft has an extended shaft liner and the split liner for the seal is no longer required.
- 3.1.22.** The seal assembly shall be completely overhauled using Service kits A, B, and C.
- 3.1.23.** The Carrier ring is currently fitted with a rubber liner that is damaged. The rubber liner shall be replaced with a new composite liner as part of the modification. Coast Guard will supply the new composite liner assembly.

- 3.1.24.** The face of the split seat shall be machined to remove roughness and grooving. The surface finish shall be as per manufactures recommended finish.
- 3.1.25.** The bellows assembly shall be renewed and overhauled with new Coast Guard supplied parts.
- 3.1.26.** The new shaft liner shall be drilled IWO drive clamp ring for alignment screws to be fitted. Four holes to be drilled Ø14mm x 10mm deep.
- 3.1.27.** The seal assembly shall be fully assembled with the exception of the seat and drive ring and suspended in the shaft tunnel as the new shaft is been installed. The seat and drive ring will be assembled after the shaft is coupled.

Disassembly Cont'd

- 3.1.28.** Area in way of the stern tube seal shall be cleaned of dirt, rust and debris before moving the shaft.
- 3.1.29.** If required, ship staff will rotate shaft to allow for hydraulic connections can be made to SKF coupling. Sections of stern tube cooling water piping and shaft seal water piping may be removed and stowed by Contractor if required. Coast Guard (GSM) shall supply hydraulic pump unit for coupling removals.
- 3.1.30.** To remove the MORGRIP bolts, shaft can be rotated and small port-a-pack jacks can be used with the strong-back to ease out the MORGRIP bolts. Flanges and MORGRIP bolts shall be marked as to their original locations and the bolts taken to the Contractor's machine shop for reference. The intermediate shaft flange bolt holes shall be dressed to remove scale and burrs. New MORGRIP bolts will be used with the new SKF coupling.
- 3.1.31.** The SKF coupling shall be removed from the shaft tunnel and then the vessel for scrap. The new SKF coupling shall have the bolt hole bores measured and compared to the measurements of the intermediate shaft bolt hole bores. The bolt holes bores shall be reamed on either the coupling or the intermediate shaft to have matching bore measurements. Morgrip coupling bolts shall be identified, removed and stored in a safe location. New Coast Guard supplied MORGRIP bolts will be used for reassembly. The bolts shall be machined to final dimensions to suit the coupling and intermediate shaft bolt hole bores. Morgrip bolts shall be cleaned up, bolt diameters and borehole diameters measured and recorded. Three (3) typewritten copies of readings shall be given to Chief Engineer.
- 3.1.32.** Tail shaft shall be pushed aft a distance of 320 mm using jacks at propeller hub.
- 3.1.33.** Disconnect inner oil pipe, and store flange bolts.
- 3.1.34.** Tailshaft shall be moved another 200 mm aft.
- 3.1.35.** Shaft and coupling location shall be marked at aft end of coupling before pumping coupling off shaft. SKF coupling shall now be pumped off using SKF pump equipment. Contractor shall ensure during removal that coupling is properly supported and does not damage tapered area of shaft. Shaft and coupling tapered sections shall be thoroughly cleaned.

- 3.1.36.** Tailshaft can now be withdrawn by Contractor using care and shall withdraw tailshaft and not damage the rubber coating between bronze liners. Forward end of the tail shaft will be required to be supported by a wood block during this procedure. Six hardwood saddles shall be fabricated to suit the radius of the shaft and stern tube. During removal Contractor shall use suitable rated nylon slings for moving and lifting of tailshaft. Also to note, ship does not have a hub lifting plate.
- 3.1.37.** Tailshaft shall be fully supported on both bronze liners on Contractor supplied cradle and situated within a protected enclosure to allow for inspection of the rubber coating.
- 3.1.38.** As the shaft is being replaced with a new shaft, the inner oil pipes shall be withdrawn from the shaft and laid aside on supported cradles to prevent bending. The pipes shall be covered with protective material to prevent ingress dirt, water etc. The old shaft shall be coated with a protective coating and wrapped to protect from corrosion and ingress of dirt. The shaft shall be removed from the dock bottom and laid aside on supported cradles until further direction from the owner on where the shaft is being delivered. The inner pipes shall be removed from the dock bottom and placed in the shipyard shop. The pipes shall be disassembled to replace the joint seals at all connections. The pipes shall be reassembled with new seals and flushed through a suitable filtering system with new oil.
- 3.1.39.** The new SKF coupling shall be fitted to the new shaft while the shaft is in the contractors shop to ensure the drive up length is correct. The new SKF coupling shall be removed and transported to the vessel in the shaft tunnel.
- 3.1.40.** The new shaft shall be lowered to the dock bottom and placed on supported cradles for preparations to be installed.
- 3.1.41.** If grit blasting or painting operations are carried out while tailshaft is out of ship, Contractor shall supply and install protective covering over the tailshaft and ensure the stern tube is blanked off.
- 3.1.42.** The forward and aft bronze tailshaft liner diameters of the new shaft shall be measured and recorded on Wartsila service sheets. The measurements shall be taken at four equal distance position over the length of each liner and measured in the Starboard/port and forward/aft directions. Three (3) type written copies shall be given to the Chief Engineer.

Sterntube Bushings:

- 3.1.43.** The six stern tube bushings shall be replaced with new Wartsila UK bushings. Remove the outer compression ring and the inner connecting ring to allow access to the sterntube bushings. The inner connecting ring shall be lifted to the mud room and laid aside. The bushings shall be removed from the sterntube.
- 3.1.44.** The existing bushing carriers shall be measured internally at several locations over the length, vertically and horizontally positions for the forward and aft carriers.

- 3.1.45.** The new Wartsila bushings require an anti-rotation key to be fitted to each carrier over the entire length of each carrier. The length of the aft carrier is 3404mm and the forward carrier is 1500mm. Two drilling jigs shall be fabricated for drilling and tapping the securing bolts for the new keys. The key shall be fitted top dead center of the carriers and maintain an alignment within $\pm 0.5\text{mm}$ forward and aft. New Coast Guard supplied keys shall be fitted and secured to the carriers.
- 3.1.46.** From the carrier measurements and calculations, the new bushings OD shall be machined to final dimensions and installed in the sterntube bearing carriers. The ID of the new bushings shall be machined to final dimensions. Measurements from the tailshaft liners shall be used to determine the final ID of the bushings. The new bushings shall be installed by means of jacks, pressing plates and strongbacks. The contractor shall fabricate all necessary tools for the installation. Installation and machining of sterntube bushing shall be in accordance with procedures specified in the Manual DPM-01. Final inside diameter measurements shall be taken at four equal distance positions over the length of the forward and aft bushings and measured in the Starboard/starboard and forward/aft directions. Three type written copies shall be given to the Chief Engineer.
- 3.1.47.** The forward and aft securing rings shall be reinstalled with new orings.
- 3.1.48.** All parts and sealing surfaces shall be thoroughly cleaned before reassembly to ensure tight seals.
- 3.1.49.** The circumferential area in the stern tube (approximately 5.6 m long x 0.92 m dia) between the forward and aft bushings shall be thoroughly grit blasted clean to remove loose scale, paint etc. and provide the required surface profile for the application of the Devcon ceramic. All debris shall be cleaned from stern tube. Before application of compound, all surfaces must be clean, dry and free of all contaminants including salt deposits.
- 3.1.50.** The cleaned steel surfaces inside the stern tube shall be fresh water washed to remove salt deposits from the steel. Bare steel shall be thoroughly dried and wire brushed to clean of any flash rusting. Complete steel area shall be surface roughened by grit blasting to remove rust blisters and to increase the adhesion ability of the steel.
- 3.1.51.** All holes and pitted areas larger than $\frac{1}{4}$ " depth x $\frac{1}{4}$ " dia shall be grit blasted to good metal. All prepared holes and pitted areas shall be filled with DEVCON CERAMIC PUTTY REPAIR (CFM). Contractor shall quote of supplying and applying 25 KG of putty material.
- 3.1.52.** After the putty has cured, one coat of DEVCON BRUSHABLE CERAMIC WHITE shall be applied over the entire bare steel area. Before the White Ceramic has fully cured and following the DEVCON technical data sheet the entire circumferential area of the stern tube shall be coated with Brushable Ceramic Blue (Contrasting colour). Contractor shall quote on supplying and applying 50 KG of material.
- 3.1.53.** Contractor shall apply all coatings as per the manufacturer's technical data sheets and supply sufficient ventilation and any heat required to allow for complete curing of coatings.

Assembly:

- 3.1.54.** The new SKF coupling shall be lowered to the shaft tunnel and supported by nylon slings and wooden blocks.
- 3.1.55.** The forward and aft stern tube bearings shall be lubricated with liquid soap (CFM), and applied sufficiently to provide lubrication during shaft installation. All tailshaft bearing surfaces shall be wiped completely clean of any dirt, sand etc. before tailshaft is installed. No grit blasting or painting operations shall be carried out until tail shaft installation is completed. Tapered end of tailshaft and SKF coupling bore shall be dressed to remove any rough material.
- 3.1.56.** Tailshaft shall be installed in good order. Care shall be used to ensure shaft is correctly aligned with stern tube and shaft coating and stern tube bushings are not damaged during this operation. Wood block shall be used on forward end to guide shaft along stern tube. When shaft is close to entering forward bushing, a small jack is used to center the shaft. Care shall be taken not to damage ceramic coating.
- 3.1.57.** The shaft can be pushed into the coupling leaving 700 mm to the intermediate shaft flange.
- 3.1.58.** See installation of Sterntube Seal.
- 3.1.59.** The coupling can now be pumped onto the old mark on the shaft. Pumping on should be done in increments of no more than 10 mm to avoid damage to the coupling seal. SKF coupling shall be moved up a total of 44.5 mm. Lubricate nut well with anti-seize. Screw on hand tight and put dowel pin in place.
- 3.1.60.** Move shaft with coupling until 300 mm remains between intermediate shaft and coupling flange.
- 3.1.61.** Connect inner oil pipe flanges using loctite on fasteners.
- 3.1.62.** Push shaft into place, ensuring bolt holes are aligned. The bolt holes of the coupling and intermediate shaft shall be reamed to the same diameter and the new MORGRIP bolts shall be machined to suit the bolt hole size. Install MORGRIP bolts as per supplied instructions. Do not exceed maximum pressure on pump.
- 3.1.63.** The shaft sleeve is now positioned and fastened. Maximum run out should be no more than 0.2 mm.
- 3.1.64.** The shaft shall be rotated by ship's staff to position the vent & drain holes on the propeller hub to the 12 o'clock and 6 o'clock positions respectively.
- 3.1.65.** The CPP system shall be filled with the appropriate oil. The propeller hub vent plug shall be removed. Header tank by pass valve shall be closed. One CPP pump is required with occasional activation of ahead and astern movement from the MCR. NOTE: LIPS service representative to ensure the blades are '0' (zero) pitched before undocking.
- 3.1.66.** Ship's staff will assist in this operation, which takes 7 to 8 hours to complete. When oil has reached the top of the vent hole, the vent plug shall be installed.
- 3.1.67.** System shall be bled of all air from within hub.
- 3.1.68.** System pumps shall be run up and blades moved to ensure free operation.
- 3.1.69.** All removed piping in shaft tunnel shall be installed and pressure tested.
- 3.1.70.** See Starboard Rope Guard installation.

- 3.1.71. Contractor to include in cost the fitting and removal of any welded lugs required to carry out this work. On completion of this work and before dry dock is flooded, all lug welds shall be ground flush. The area of damaged coating shall be prepared and repaired with Intershield 163 Inerta 160. The coating preparation and application shall be applied as per International Coating specifications.
- 3.1.72. All tools provided by CCG shall be cleaned and returned to storage areas and secured under the supervision of Chief Engineer's designate.
- 3.1.73. The completed installation shall be functionally tested during sea trials.

3.2 Location

- 3.2.1. Shaft Tunnel Starboard Side

3.3 Interferences

- 3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1. All work shall be completed to the satisfaction of the Chief Engineer & ABS.
- 4.1.2. ABS shall inspect all disassembled parts.

4.2 Testing

Dock & Sea Trials.

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1 Wartsila Canada shall provide a written report consisting of observations, defects, repairs, recommendations, and measurements to the Chief Engineer.

- 5.1.2 Contractor shall provide records of measurements in type written form to the Chief Engineer

5.2 SparesN/A

5.3 TrainingN/A

5.4 ManualsN/A

Spec item #: ED-05	SPECIFICATION	TCMSB Field #: N/A
Stbd Shafting System Alignment		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to check the alignment of the Starboard shaft system from the gearbox running aft.
- 1.2** This work shall be carried out in Conjunction with the following:
Starboard Tailshaft Replacement and Survey

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Installation Alignment Main Engines & Gearboxes & Propulsion Shafting # 61-00-SK45
- 2.1.2.** Propulsion Machinery HD Bolts & Chocks # 60-00-04
- 2.1.3.** TFOX Tailshaft

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT

2.3 Regulations

- 2.3.1.** TC Marine Machinery Regulations

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The following is Wartsila's General Process for Alignment, to be considered only estimations.
- Typically the team requires one day prior to the docking of a vessel.
 - One day prior to the shaft dismantling for a reference measurement – hull deflection when compared to the pre docking measurement.
 - One day for measurements of the intermediate shafting, to be left in place.
 - One day for measurements with the tailshaft removed and free line of sight to the intermediate shaft aft coupling.
 - New calculation for evaluation of current alignment.
 - In-situ machining may be required.
 - Depending on the findings, the repair process will be adapted to the requirements.
 - After repair we need one day for the final set of measurements and installation of portable monitoring system.
 - In total we would estimate approximately 10 days, but to be integrated in the docking schedule.
- 3.1.2.** Contractor shall obtain the services of Wartsila Propulsion Alignment Specialist to perform the specified work. Contractor shall have an allowance of \$50,000.00 for their services and adjusted by 1379 following proof of invoice. Allow 2 days to perform pre-drydocking alignment checks as reference. Allow 2 days prior to shaft dismantling for a reference measurement hull deflection when compared to pre-docking measurement. Allow 2 days for alignment checks while tailshaft is removed during drydock and a free line of sight to the intermediate shaft. Allow 10 days for the alignment and subsequent adjustments while the vessel is floated after drydocking. The contractor shall provide 3 workers to assist in the alignment procedures.
- 3.1.3.** The contractor shall provide a separate quote for work described in this section of the specification item. This shall be used if the bearings have to be repositioned. If the bearings positions are to be adjusted the chockfast shall be removed and replaced with steel adjustable chocks (Vibro-chock). The bearing and structural seat shall be thoroughly cleaned to a flat surface, any proud areas shall be ground smooth. Contractor shall allow \$15,000.00 for the purchase of 12 steel adjustable chocks (Vibro-chock) to suit the application, to be adjusted by 1379 following proof of invoice.
- 3.1.4.** The final alignment procedure shall be completed while the vessel is afloat and following the drydocking portion of the refit.
- 3.1.5.** The alignment check shall make use of strain gauges, load measuring gauges, displacement, and laser alignment equipment. The contractor may also use 3D scanning methods in conjunction with bearing load measuring methods.
- 3.1.6.** The three shaft bearings shall be aligned as instructed by the Wartsila Alignment Specialists.

3.2 Location

3.2.1. Port side Shaft Tunnel

3.2.2. Port Side Aft Lower Auxiliary Machinery Compartment

3.2.3. Aft Main Engine Room

3.3 Interferences

3.3.1 Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer & ABS.

4.2 Testing

Dock Trial and Sea Trails

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Provide copies of Wartsila service reports and alignment reading.

5.1.2 Provide copies of the main engine to gearbox alignment readings.

5.2 SparesN/A

5.3 TrainingN/A

5.4 ManualsN/A

Spec item #: ED-06	SPECIFICATION	TCMSB Field #: N/A
Stbd Propeller Survey		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to shall be to open the entire starboard propeller shaft system for inspection and maintenance. The vessel shall obtain a credit for the survey by ABS. The blades shall be replaced with spare CCG supplied propeller blades.
- 1.2** This work shall be carried out in Conjunction with the following:
- Starboard Tailshaft, Coupling, and Sterntube Bushing Replacement
 - Underwater Hull Maintenance

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** LIPS Drwg #A006682
- 2.1.2.** The WARTSILA / LIPS contact is:
Barry Broderick
Wartsila Canada, Mount Pearl, NL
LIPS dwg # A1-11582Prop.
Diameter: 4800 mm
Material: Cunial
Mass per blade: approx. 3,500 kg x 4 blades
Mass Propeller Hub: 23678 Kg

2.2 Standards

- 2.2.1.** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2.** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3.** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.4.** Coast Guard ISM Hotwork procedures
- 2.2.5.** Coast Guard ISM Fall Protection procedures
- 2.2.6.** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7.** CWB CSA 47.1 latest revision Division I, II or III
- 2.2.8.** SSPC-SPT
- 2.2.9.** (a) TP 127E-TC Marine Safety Electrical Standards.
- 2.2.10.** (b) IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.

2.3 Regulations

2.3.1. Marine Machinery Regulations CSA

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** Starboard propeller shall be disassembled for inspection.
- 3.1.2.** The contractor shall allow \$50,000.00 in its bid for the subcontracted services in addition to the cost of the contractor's own work.
- 3.1.3.** The Coast Guard will be retaining the services of the Wartsila FSR for all of the work on this item which shall be carried out in accordance with the recommended manufacturer's instructions and under the direction of the WARTSILA / LIPS Field Service Representative
- 3.1.4.** Coordination of related spec items shall be at the contractor's discretion, but contractor shall note requirement in, Shaft removal, for blade/hub position shall be at full astern to facilitate shaft removal.
- 3.1.5.** Oil shall be drained from hub and disposed of by Contractor, approximately 1,200 liters of oil in hub assembly.
- 3.1.6.** The procedures listed below are for guidance only since the LIPS Service Representative will determine the correct order for hub disassembly and later assembly.
- 3.1.7.** Blades shall be removed at top dead center (12 o'clock position). Each blade has 9 retaining bolts, 5 forward, 4 aft. Blades bolts are tied together with stainless steel round bar spot welded to the bolt heads. There are 2 lifting points located at the root of each blade. The shaft must be rotated by ship's staff to bring each blade to the TDC position.
- 3.1.8.** Contractor shall prepare & fit rigging (wire & nylon slings, shackles etc) for blade removal at suitable lifting points located over the propellers. Coast Guard will supply the blade lifting rig. Spot-welded stainless steel round bar shall be carefully cut off at welds using a grinder. Contractor shall renew SS round bars.
- 3.1.9.** The Hytorc Tool for Propeller Bolts will be provided by the ship, vice as written.
- 3.1.10.** The pre-tensioned blade bolts shall be released under the direction of the LIPS service representative using ship supplied HY-TORC equipment. Bolt release HY-TORC pressures shall be recorded. Bolts shall be marked before withdrawal. Each blade shall be marked to return to original location on hub. Blade bolts shall be moved to a safe location for stowage, ensuring threads are suitably protected.

- 3.1.11.** Fit lifting eyes to blade and connect to rigging such that blade is lifted evenly from hub. Extra care must be taken to ensure there is no damage to the blade housing on the hub assembly. Removed blade shall be moved to a suitably clean and sheltered area so that the blade is protected from any possible damage. Repeat for remaining 3 blades.
- 3.1.12.** The contractor shall allow \$20,000 in its bid for the subcontracted services of blade repair. The Contractor shall include the shipping costs in the cost of its own work.
- 3.1.13.** The Contractor shall arrange for a blade repair specialist to carry out the following work on all four of the port blades. Blades shall be sent to contractor's facility. Edges shall be dressed and cleaned and the blades measured. All porous areas shall be cleaned and filled with Devcon Bronze Putty and refinished smooth. Blades shall be balanced. Type written copy of the blade repair shall be given to the Chief Engineer.
- 3.1.14.** Hub cover shall be removed. The propeller hub shall be removed and transported to the shop for disassembly.
- 3.1.15.** Sliding piston yoke and blade carriers shall be removed. Due care and attention shall be taken with disconnection of internal piping from yoke. Emergency piston shall be removed from tailshaft and shall be cleaned and inspected.
- 3.1.16.** All parts shall be inspected. Sliding blocks, yoke pins and blade carrier slots shall all be measured and sliding block clearances determined.
- 3.1.17.** Open hub and all associated components shall be adequately wrapped and protected while disassembled. Contractor shall be responsible for ensuring that no foreign material of any sort accesses hub internals.
- 3.1.18.** The hub shall be measured in areas directed by the FSR.
- 3.1.19.** The hub assembly shall be reassembled with new, owner supplied (GSM) seals, Inner pipe shall be reconnected to yoke.
- 3.1.20.** The 4 propeller blades shall be fitted with new CCG (GSM) supplied o-rings and shall be reinstalled. All blade surfaces shall be thoroughly cleaned of all dirt or debris.
- 3.1.21.** Before lifting each marked blade to the appropriate location, the blade flange and mating surfaces shall be checked for any damage. Apply grease as required.
- 3.1.22.** Lower each blade into position taking extra care to avoid damage to the sealing and mating surfaces. Prior to the final lowering of the blade, ensure the hub assembly is completely free of dirt etc.
- 3.1.23.** Position the blade over the hub blade housing and line up vertically and laterally. Line up the blade retaining bolt holes on the blade with the corresponding holes in the hub.
- 3.1.24.** Lower the blade in place until the locating pins in the hub assembly have engaged in holes in the blade flange. As soon as the blade flange is engaged in the hub assembly, fit 2 bolts: one on the forward side, one on the aft side and engage threads. This will ensure the blade is in the correct position.
- 3.1.25.** Lower the blade all the way down to the final position and screw down on the 2 bolts by hand. Fit all the remaining bolts and hand tighten.

- 3.1.26.** Position and fit the hydraulic HY-TORC pump and sockets. Tighten bolts as per LIPS specifications and in rotation as required. Shaft shall be rotated to fit the 3 remaining blades in original locations.
- 3.1.27.** Upon completion of the bolt and blade installation, Contractor shall spot weld in place stainless steel locking bar as per original installation.
- 3.1.28.** Hub shall be refilled with approx 1,200 liters of Harmony AW 68 (CFM). All hub plugs shall be reinstalled and locked in position.
- 3.1.29.** Contractor shall supply the material and fabricate four (4) naval bronze plugs as per supplied sample. Plugs shall be installed where missing in the lifting eye hole on the forward side of the blades one bronze plug each complete with neoprene gasket of suitable thickness. Loctite PST 565-31 shall be used on the threads. Contractor shall quote on the installation of one plug. The exact number required will be determined when the vessel is docked and will be adjusted by 1379 action.
- 3.1.30.** All work shall be completed to the satisfaction of the Chief Engineer and ABS Surveyor.

3.2 Location

- 3.2.1.** N/A

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer, Wartsila Field Service Rep, and ABS Inspector.

4.2 Testing

Drydock, Dock Trials & Sea Trials.

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Provide copies of Wartsila service reports.

5.2 Spares
N/A

5.3 Training
N/A

5.4 Manuals
N/A